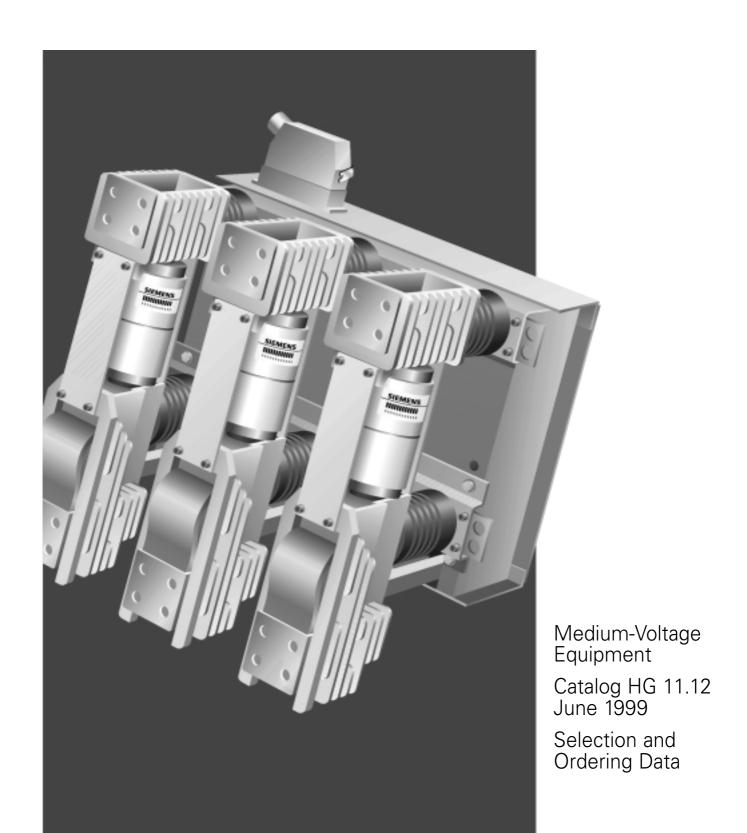
# **SIEMENS**

# 3AH Vacuum Circuit-Breakers





8BJ50 medium-voltage withdrawable switchgear with 3AH vacuum circuit-breaker on central truck

Airport Munich

#### Page Catalog section 1 Supply program 1/2 Technical 1/2, 1/3 specifications 1/4 Order No. structure Additional equipment 1/5 (Order codes for Order No.)

#### Features of 3AH vacuum circuit-breakers

### Standard circuit-breakers

#### 3AH1

- Up to 10,000 operating

cycles - Up to 24 kV

#### 3AH3

- Rated short-circuit breaking currents up to 63 kA
- Rated normal currents up to 4000 A
- Up to 10,000 operating cyclesUp to 36 kV

#### Frequent-operation circuit-breakers

#### 3AH2

- Up to 60,000 operating cycles

  – Up to 24 kV

#### 3AH4

- For very high numbers of operating cycles, up to 120,000 operating cycles
- 24 kV and 36 kV

#### Economy circuit-breakers

#### 3AH5

- For small switching capacities
- Individual secondary equipment - Up to 10,000 operating
- cycles
- 12 kV to 36 kV

#### **High-current** circuit-breakers

#### 3AH3 8

- Rated short-circuit breaking currents 50 kA to 80 kA
- Rated normal currents up to 12,000 A
- Up to 10,000 operating
- cycles 17.5 kV

#### Traction circuit-breakers,1-pole

#### 3AH4 7

- Rated short-circuit breaking currents
- up to 50 kA

   Rated normal currents
  up to 2500 A
- Rated lightning impulse withstand voltage 125 kV to 250 kV
- Up to 60,000
- operating cycles
   17.5 kV, 16<sup>2</sup>/<sub>3</sub> Hz and
  27.5 kV, 50/60 Hz

#### Special circuit-breakers

On request

- Special circuit-breakers, 1, 2 and 3-pole
- Explosion-protected circuit-breakers

# **SIEMENS**

3AH Vacuum Circuit-Breakers

Contents	
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3AH2/3AH4 Frequent-Operation Circuit-Breakers	3
3AH5 Economy Circuit-Breakers	4
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3AH4 7 Traction Circuit-Breakers, 1-Pole	6
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Medium-Voltage Equipment Catalog HG 11.12 · June 1999

Supersedes: Catalog HG 11.12 · July 1997

# Description

3AH Vacuum Circuit-Breakers

#### Supply program, technical specifications

#### 3AH circuit-breakers available

Standard circuit-breakers

□3AH1

O3AH3

Frequent-operation circuit-breakers

■3AH2

● 3AH4

**Economy** circuit-breakers

△3AH5

High-current circuit-breakers

▲3AH38

<u>Traction</u> circuit-breakers, 1-pole

\*3AH47

Special circuit-breakers

On request

- e.g. Special circuitbreakers, 1, 2 and 3-pole
- Explosion-protected circuit-breakers

		/		/ inc	Rated ulation	n level							AH cii ilable	rcuit-k	oreakers	
			Solo Political P		ency		A State of the sta	5/	/ * /	Ment 1	rio /					
		/ /	/ %. /	Mel Flegg		, est	Rated St.	'W CILL	s, Jing	nor	at rated mal cu		$I_{\rm r}$			
	O Paris	Attitud of the last of the las	Silve of	34° () 8	auco !	Cuit Die	cuit du pre	akirini								
A VOI	30,1607	drithing of	young of	centre d.	Shouting	shorting	metrico.	or.c	_	P	P	P	P	P	- F" OF"	
Rafed 18	Sagari,	Kate n	ing 696	Rate	\28tg	beau.	. Agree	\ g	1, 1,	20° 20°	DP 75	3/6	SOF ACC	80	0 P. 200 P.	
	kV	kV	mm	kA	S	kA	kA									
7.2 kV 50/60 Hz	60	20	210	20 25 31.5	3 3 3	22.4 28.0 35.4	50 63 80									
				40 50	3 3	44.9 56.1	100 125		0			0				
			275	63	3	70.7	160		0		0	0	0			
12 kV 50/60 Hz	75	28	160	13.1 16 20	3 3 3	14.7 17.9 22.4	32.8 40 50	$\triangle$ $\triangle$	Δ							
				25 31.5	3 3	28.0 35.4	63 80									
			210	13.1 16 20	3 3 3	14.7 17.9 22.4	32.8 40 50	$\triangle$	Δ							
				25 31.5	3 3	28.0 35.4	63 80									
				40 50	3 3	44.9 56.1	100 125									
			275	63	3	70.7	160		0		0	0	0			
15 kV 50/60 Hz	95	36	160	25	3	28.0	63									
			210	20 25 31.5	3 3 3	22.4 28.0 35.4	50 63 80									
				40 50	3	44.9 56.1	100 125									
			275	63	3	70.7	160		0		0	0	0			
17.5 kV 50/60 Hz	95	38	160	25	3	28.0	63									
00,00112			210	20 25 31.5	3 3 3	22.4 28.0 35.4	50 63 80									
				40 50	3 3	44.9 56.1			0		0	0		<b>A</b>	<b>A</b>	
			275	63 63 <sup>2)</sup> 80	3 3 3	70.7 70.7 89.8	160		0		0	0	0	<b>A</b>	<b>A</b>	
17.5 kV 16 <sup>2</sup> /3 Hz	125	50	-	25 31.5	3	28 35.4	63 80			* *						
				40 50	3	44.9 56.1					* *					
24 kV 50/60 Hz	125	50	210	16 20 25	3 3 3	17.9 22.4 28.0	40 50 63									
			275	16 20 25	3 3 3	17.9 22.4 28.0	40 50 63									
				40	3	44.9	100				0					
27.5 kV 50/60 Hz	170	70	-	25 31.5	3	28 35.4	63 63		*	*	*					
	250	105	-	25	3	28	63		*	*						
36 kV 50/60 Hz	170	70	350	16 31.5 40	3 3 3	17.9 35.4 44.9	40 80 100		△ ○ <b>●</b>	0	00					

<sup>1)</sup> Three breaker poles per phase.

<sup>2)</sup> Also as high-current circuitbreaker acc. to ANSI C37.013 for rated normal currents from 3150 A to 12000 A.

## 3AH Vacuum Circuit-Breakers **Description**

#### **Technical specifications**

#### **Operating times**

	/18			Vac	uum circuit	breaker ope	rating time
Open the good and the control of the	Jacust dictit beater		3ALM and 31	3AH3 and 3	akta 3Ato	3R/13&3	3AHA7
<u> </u>				ĺ	ĺ	ĺ	ĺ
Closing time	_	ms	< 75 <sup>1</sup> )	< 80 <sup>1</sup> )	< 75 <sup>1</sup> ) <sup>2</sup>	<sup>2</sup> ) < 80 <sup>1</sup> )	< 80 <sup>1</sup> )
Opening time	1st shunt release	ms	< 65 <sup>1</sup> )	< 65 <sup>1</sup> )	< 65 <sup>1</sup> )	< 65 <sup>1</sup> )	< 65 <sup>1</sup> )
	2nd and 3rd releases	ms	< 50	< 45	< 50	< 45	< 45
Opening time	Instantaneous release	ms	_	_	_	_	< 17
Arcing time	_	ms	< 15	< 15	< 15	< 15	< 15 <sup>3</sup> )
Break time	1st shunt release	ms	< 80	< 80	< 80	< 80	< 80
	2nd and 3rd releases	ms	< 65	< 60	< 65	< 60	< 60
Dead time	_	ms	300	300	300	300	300
CLOSE/OPEN time	1st shunt release	ms	< 80	< 90	< 75	< 90	< 90
	2nd and 3rd releases	ms	< 65	< 70	< 60	< 70	< 70
Minimum command duration	Closing solenoid	ms	45	45	45	45	45
	1st shunt release	ms	40	40	40	40	40
	2nd and 3rd releases	ms	20	20	20	20	20
Pulse time for breaker tripping signal	1st shunt release	ms	> 15	> 15	> 15	> 15	> 15
	2nd and 3rd releases	ms	> 10	> 10	> 10	> 10	> 10
Spring-charging time for electrical operation	_	S	< 15	< 15	< 10	< 15	< 15
Synchronous operation error between the poles	_	ms	2	2	2	2	_

#### **Rating plate**

Example (full size)

#### <u>Note</u>

For further information concerning determination of spare parts, subsequent delivery, etc. the following 4 details are required:

- <u>Type</u> designationSerial <u>No</u>.
- <u>Design</u> code
- Year of manufacture



#### **SIEMENS**

	Туре	3AH1055-2	De	sign code	1E		
	No.	S 3AH/00005663	Year of manufacture 199				
	$U_{\rm r}$	7.2 kV, 50/60 Hz	$I_{\rm r}$	1250 A			
	$I_{ m sc}$	31.5 kA	$t_{ m k}$	3 s			
	$U_{\mathfrak{p}}$	60 kV	m	110 kg			
-							

Rated operating sequence: O- 0.3s -CO-3min-CO MADE IN GERMANY

<sup>1)</sup> Shorter operating times on request

<sup>2)</sup> With stored-energy mechanism

<sup>3)</sup> Arcing time < 33 ms at rated frequency of 16<sup>2</sup>/<sub>3</sub> Hz

## 3AH Vacuum Circuit-Breakers Description

#### Order No. structure

#### **General data**

The vacuum circuitbreakers consist of a primary and a secondary part. The relevant data make up the 16-digit Order No.

The primary part contains the principal electrical data of the breaker poles.

The secondary part covers the auxiliary devices which are necessary for operating and controlling the vacuum circuit-breaker.

#### Additional equipment

One item of additional equipment is covered by one order code. When an order is placed, this should be stated together with the Order No.

Several types of additional equipment can be ordered at the same time, i.e. several order codes can be added to the Order No. in succession and in any sequence.

In the case of further additional equipment which cannot be ordered by means of the order codes, the Order No. must be suffixed by "-Z", the order code Y99 and the item stated in plain text in addition (prior consultation with department EV MNK V in Erlangen is required).

		_ A ≜ alphabetical, N ≜ numerical	/
,	o tailer the	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16.	78, 78
18/70	o Deitor data	/ 0:	Order ode
/ Olgg	/sa*	3AH	<b>* * *</b>
	Upper group (technica High-voltage equipme Low-voltage equipme	nt,	
2nd pos.	Main group (type of pr	roduct)	
3rd pos.	Subgroup (product gro Indoor vacuum circuit-		
4th pos.	Circuit-breaker type		
	Standard circuit-breakers	for 10,000 operating cycles up to 24 kV	
	Frequent-operation circuit-breakers	for 60,000 operating cycles up to 24 kV2	
	Standard circuit-breakers	for 10,000 operating cycles up to 63 kA, up to 36 kV <b>3</b>	
	Frequent-operation circuit-breakers	for 120,000 operating cycles for 24 kV and 36 kV <b>4</b>	
	Economy circuit-breakers	for 10,000 operating cycles for 12 kV to 36 kV <b>5</b>	
4th and 5th pos.	Traction circuit-breake High-current circuit-bre	rs, 1-pole	
		Pole-centre distribution of the control of the cont	
6th pos.		distance	
	12 kV, 50/60 Hz		
	15 kV, 50/60 Hz	160 mm1 5	
	17.5 kV, 50/60 Hz	275 mm1 71 8 1	
	•	275 mm <sup>2</sup>	
	17.5 kV, 16 <sup>2</sup> / <sub>3</sub> Hz	1-pole	
	24 KV, 50/60 HZ		
	27.5 kV, 50/60 Hz		
	36 kV, 50/60 Hz	350 mm <b>3 0</b>	
7th pos.	Rated short-circuit bre		
	16 kA	2	
		3	
		4	
		5	
		7	
	63 kA	8	
	80 kA	0	
8th pos.	Rated normal current		ditional
- ti.   p			iipment
		2	ed in alog)
			-
	2000 A		Order No.
			/ need to bo
	2500 A		need to be ixed with
	2500 A 3150 A (8000 A for high	gh-current circuit-breaker) 5   suff	

applications, standard: ANSI C37.013

1) For generator

16th pos. Secondary equipment (see catalog sections 2 to 6)

<sup>2)</sup> For high-current circuit-breaker

## 3AH Vacuum Circuit-Breakers Description

#### Order codes for Order No.

## **Additional equipment** Overview

nteri	Usable for vacuum circuit-breaker type							
Reditional aculipment	3ALT	3ALT	3MA	3AH	3011	344	303	7 Orbet code
Halogen-free and flame-retardant wiring cables	•	•	•	•	•	•	•	A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated	•	•	•	•	•	•	•	A20
Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	•	•	•	•	•	•	•	A21
Condensation protection, heating for 230 V AC	•	•	•	•	•	•	•	A30
Silicone-free design	•	•	•	•	•	•	-	A31
Current transformer-operated release (tripping pulse $\geq$ 0.1 Ws) for protective relay made by SEG	•	•	•	•	•	•	-	A45
Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	•	•	•	•	•	•	-	A46
Vacuum circuit-breaker for reclined installation	-	-	•	•	-	-	-	A70
Vacuum circuit-breaker for upright or reclined installation	-	-	• 1)	-	-	•	-	A71
Additional rating plate provided separately	•	•	•	•	•	•	•	B00
Upper plug part not supplied	•	•	•	•	•	•	•	B23
Special wiring on request	•	•	•	•	•	•	-	B99
Primary current paths silver-plated for external terminals and internal connections on both sides	•	•	•	•	-	•	-	D10
Primary current paths tinned for special ambient conditions	•	•	•	•	-	•	-	D11
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 42 kV instead of 28, 36 or 38 kV (at $U_{\rm f}$ = 12, 15 and 17.5 kV)	•	•	•	•	•	•	-	E13
Rated lightning impulse withstand voltage $U_{\rm p}$ = 185 kV instead of 170 kV (at $U_{\rm r}$ = 36 kV)	-	-	•	•	-	-	-	E14
Rated short-time power frequency withstand voltage $U_{\rm d}$ = 85 kV instead of 70 kV (at $U_{\rm f}$ = 36 kV)	-	-	•	•	-	-	-	E15
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 32 kV instead of 20 kV (at $U_{\rm f}$ = 7.2 kV)	•	•	•	•	-	-	-	E16
Routine test certificate	•	•	•	•	•	•	•	F20
Hand crank (also with motor-operated mechanism) for manual charging of the closing spring in the vacuum circuit-breaker	•	•	•	•	•	•	•	F30
Rating plate with additional data as requested by customer	•	•	•	•	•	•	•	Y12
Special designs (not as per catalog): Additionally state desired design in plain text	•	•	•	•	•	•	•	Y99

<sup>•</sup> Possible

<sup>-</sup> Not provided





Vehicle production (photo Volkswagen Factory, Wolfsburg)

Catalog section 2	Page
Ordering data, examples for ordering	2/2
Selection and ordering data for – 7.2 kV – 12 kV – 15 kV – 17.5 kV – 24 kV – 36 kV	2/3 2/4 2/5 2/6 2/7 2/8
Secondary equipment - Selection - Order No. suffixes 2/1	2/9 0, 2/11
Accessories and spare parts 2/1:	2, 2/13

#### Features of standard circuit-breakers

- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 63 kA (r.m.s. value), up to 50 operating cycles
- DC component 36 %, higher values on request
- Values of transient recovery voltage acc. to IEC 60056, other values on request
- Upright installation (standard), reclined installation for 3AH3 standard circuit-breakers, to be ordered with order code "A70"
- Suitable for use in conjunction with, for example:
- Overhead lines and cablesTransformers

Standard circuit-breakers acc. to IEC 60056; standard circuit-breakers 3AH3 81. acc. to ANSI C37.013 for  $U_{\rm r}$  = 17.5 kV,  $I_{\rm sc}$  = 63 kA,  $I_{\rm r}$  up to 4000 A – Capacitors

- Filter circuits
- Motors
- Reactors

#### Ordering data, examples for ordering

#### **Ordering data**

The 3AH1 / 3AH3 standard circuit-breakers are determined by a 16-digit Order No. According to the equipment fitted to the standard circuit-breakers, this Order No. must be suffixed by one or more order codes.

- For selection and ordering data of the primary equipment with additional equipment see pages 2/3 to 2/8.
- For associated Order No. suffixes (secondary equipment) see pages 2/10 and 2/11.



1st to 8th	3AH1 standard circuit-breaker:		
position	$\begin{array}{llllllllllllllllllllllllllllllllllll$	<i>U</i> <sub>p</sub> 60 kV	0 5 4 - 2
th position	Closing solenoid, 1st shunt release and undervoltage release	2/10	 
10th position	Electrical local closing, closing solenoid operating voltage 230 V AC	2/10	<b>- V -</b>
11th position	1st shunt release operating voltage 110 V DC	2/10	4
12th position	2nd release (undervoltage) operating voltage 220 V DC	2/10	– 5 –
13th position	Without 3rd release	2/11	– – 0
14th position	Operating mechanism voltage 230 V AC	2/11	– – . <b>K</b>
15th position	Without mechanical interlocking, auxiliar 12NO + 12NC, 64-pole plug connector_		C .
16th position	System frequency 50 Hz, rating plate and operating instructions in German	2/11	– – 0
When ordering	ı state:	rder No. 3 A H 1	0 5 4 - 2 F V 4 5 - 0 K C 0

#### 2nd example for ordering

When ordering	g, state:	Order No. Order codes	3 A H 1 L 1 D +	0 5 4 - 2 F V 9 9 - 0 K C 0 M 1 F	
12th position	2nd release (undervoltage) operating as special voltage 240 V DC		)	9	M 1 F
11th position	1st shunt release operating voltage as special voltage 125 V DC	2/10	)	9	L 1 D
	Standard circuit-breaker as in 1st exa but	<u>mpie,</u>	3 A H 1	0 5 4 - 2 F V 0 K C 0	

#### 3rd example for ordering

3AH1 standard circuit-breaker:

1st to 8th

When ordering	n state.	rder No. 3 A H 1	105-	- 1ME 4	10-0K	H 2 – Z	
16th position	System frequency 50 Hz, rating plate and operating instructions in English	2/11		·		. 2	
15th position	With mechanical interlocking, auxiliary sv 6NO + 6NC, 24-pole terminal strip				–	н	
14th position	Operating mechanism voltage 230 V AC	2/11			<b>–</b> . K		
13th position	Without 3rd release	2/11			– 0 .		
12th position	Without 2nd release	2/10			. 0 –		
11th position	1st shunt release operating voltage 110 V DC	2/10		4	1		
10th position	Mechanical local closing, closing solenoid operating voltage 110 V DC	2/10		E .	<del>-</del>		
9th position	Closing solenoid, 1st shunt release and varistor circuitry	2/10		M	–		
	Additional equipment: Rated short-time power frequency withs $U_{\rm d} = 42$ kV instead of 28 kV				–	– Z E	E 1 3
position	<ul> <li>Rated voltage U<sub>r</sub> 12 kV</li> <li>Rated short-circuit</li> <li>breaking current I<sub>sc</sub> 31.5 kA</li> <li>Rated lightning impulse withstand voltage of the properties of</li></ul>		105-	-1	–		

Order code E 1 3

7.2 kV

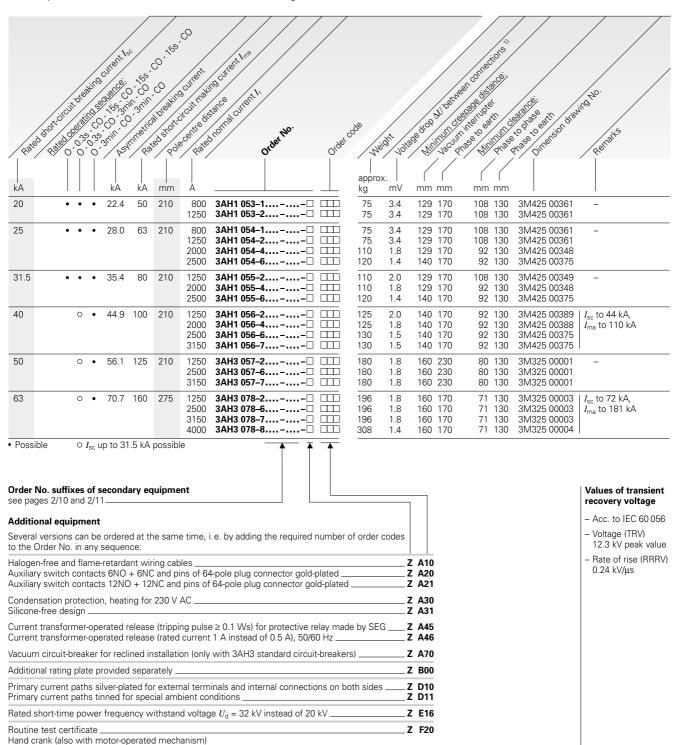
Rated voltage  $U_r$  7.2 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **60 kV** Rated short-time power frequency withstand voltage  $U_{\rm d}$  **20 kV** (up to 32 kV see "Additional equipment")

DC component DC = 36 % of the rated short-circuit breaking current

for manual charging of the closing spring in the vacuum circuit-breaker \_

Special designs (not as per catalog): Additionally state desired design in plain text \_



Z F30

<sup>1)</sup> According to IEC 60 694 with 100 A DC

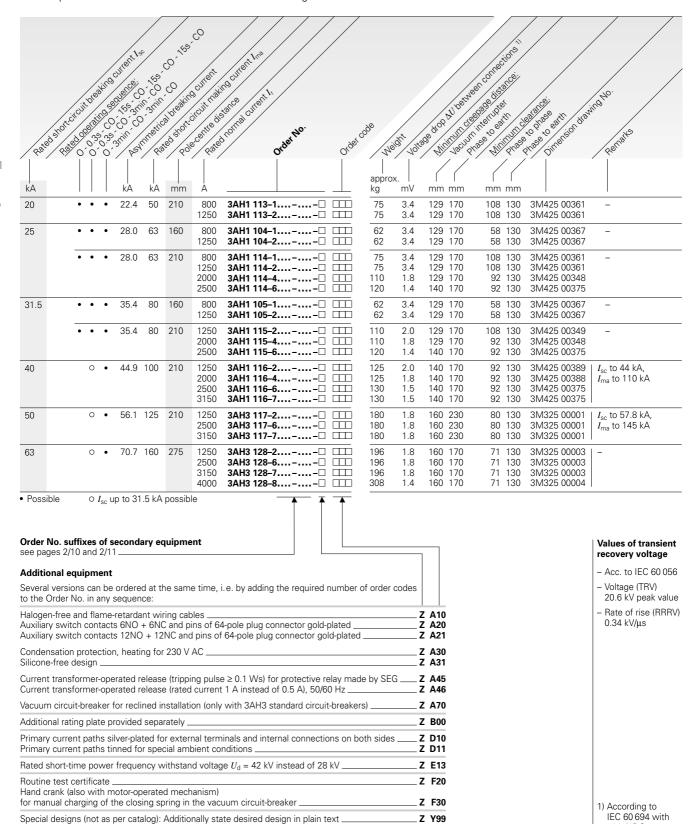
12 kV

100 A DC.

Rated voltage  $U_r$  12 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  75 kV Rated short-time power frequency withstand voltage  $U_{\rm d}$  28 kV (up to 42 kV see "Additional equipment")

DC component DC = 36 % of the rated short-circuit breaking current

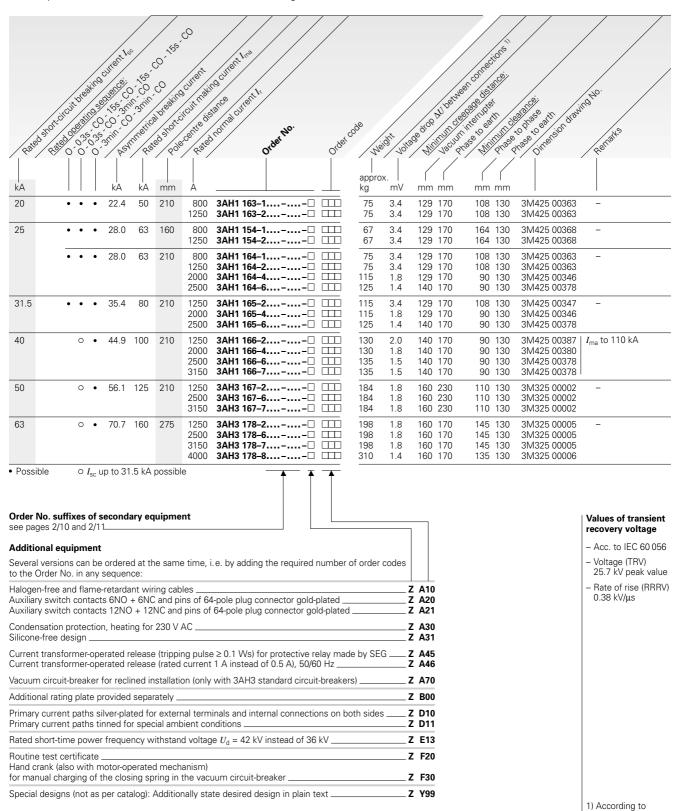


15 kV

Rated voltage  $U_r$  15 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  95 kV Rated short-time power frequency withstand voltage  $U_{\rm d}$  36 kV (up to 42 kV see "Additional equipment")

DC component DC = 36 % of the rated short-circuit breaking current



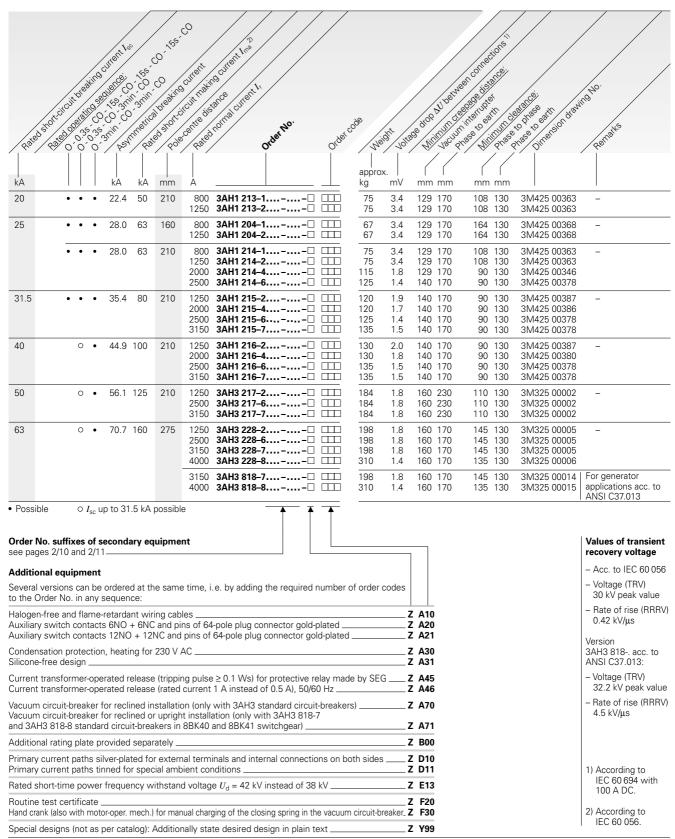
17.5 kV

Rated voltage  $U_r$  17.5 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  95 kV

Rated short-time power frequency withstand voltage  $U_d$  38 kV (up to 42 kV see "Additional equipment")

DC component DC = 36 % of the rated short-circuit breaking current



24 kV

Rated voltage  $U_r$  24 kV

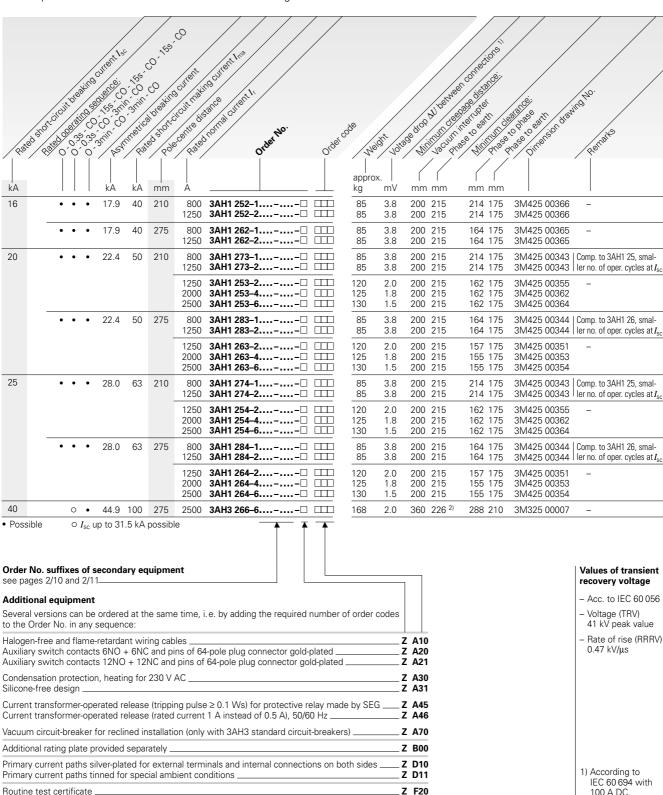
Hand crank (also with motor-operated mechanism)

for manual charging of the closing spring in the vacuum circuit-breaker\_

Special designs (not as per catalog): Additionally state desired design in plain text.

Rated lightning impulse withstand voltage  $U_{\rm p}$  125 kV Rated short-time power frequency withstand voltage  $U_{\rm d}$  50 kV

DC component DC = 36 % of the rated short-circuit breaking current



Z F20

Z F30

Z Y99

100 A DC

creepage distance

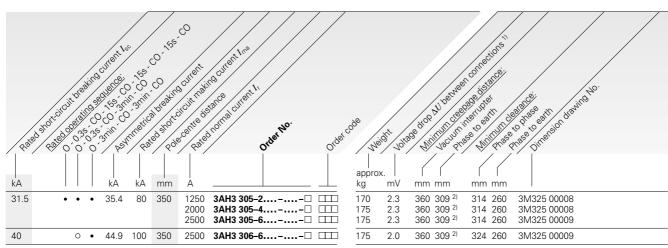
via operating rod.

2) Minimum

36 kV

Rated voltage  $U_r$  36 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **170 kV** (up to 185 kV see "Additional equipment") Rated short-time power frequency withstand voltage  $U_{\rm d}$  **70 kV** (up to 85 kV see "Additional equipment") DC component **DC = 36 %** of the rated short-circuit breaking current



• Possible  $\circ$   $I_{sc}$  up to 31.5 kA possible

## Order No. suffixes of secondary equipment see pages 2/10 and 2/11

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	_ z	A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated		A20
Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated		A21
Condensation protection, heating for 230 V AC		A30
Silicone-free design	Z	A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG	z	A45
Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	_ Z	A46
Vacuum circuit-breaker for reclined installation (only with 3AH3 standard circuit-breakers)	_ <b>z</b>	A70
Additional rating plate provided separately	z	B00
Primary current paths silver-plated for external terminals and internal connections on both sides	_ z	D10
Primary current paths tinned for special ambient conditions	Z	D11
Rated lightning impulse withstand voltage $U_p$ = 185 kV instead of 170 kV	Z	E14
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 85 kV instead of 70 kV		E15
Routine test certificate	z	F20
Hand crank (also with motor-operated mechanism)		
for manual charging of the closing spring in the vacuum circuit-breaker	Z	F30
Special designs (not as per catalog): Additionally state desired design in plain text	_ z	Y99

## Values of transient recovery voltage

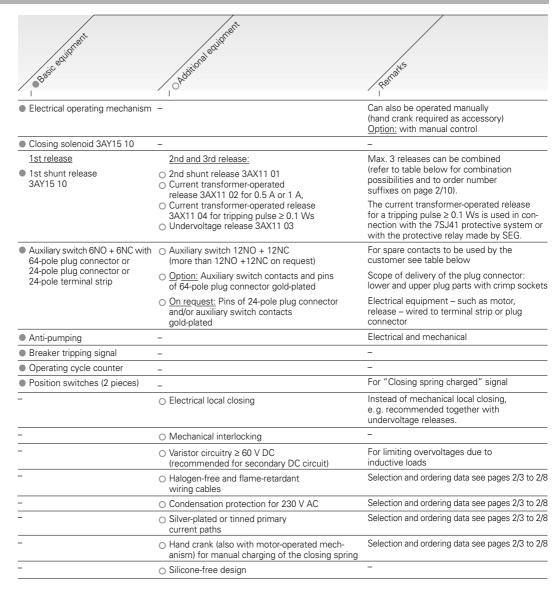
- Acc. to IEC 60 056
- Voltage (TRV)62 kV peak value
- Rate of rise (RRRV) 0.57 kV/µs

<sup>1)</sup> According to IEC 60 694 with 100 A DC.

<sup>2)</sup> Minimum creepage distance via operating rod.

#### Secondary equipment

#### Basic equipment, additional equipment



#### Combination possibilities of the releases

		Release	combinations
Relates I	\ <u>`</u>	2	\mathrew{0}
1st shunt release	•	•	•
2nd release (shunt release, undervoltage release or current transformer-operated release)	_	•	•
3rd release (shunt release, undervoltage release or current transformer-operated release)	-	-	•

• 1 piece per release A maximum of 3 releases can be combined

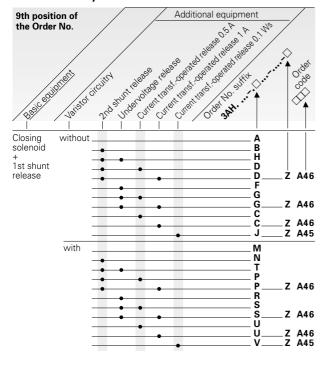
#### **Auxiliary switch** contacts which can be used by the customer

1) Depending on the accessories fitted, spare terminals remain on the plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes. Prefabricated cables are available as accessories

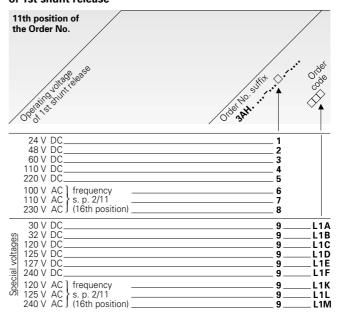
RATE WITCH	Spare contacts to be us	sed by the customer	,	Audilable of Santel	» >
		With basic equipment:	With maximum equipment:	With basic equipment:	With maximum equipment:
6NO + 6NC	64-pole: Plug connector 24-pole: Plug connector or terminal strip	2NO + 2NC + 2C/O -	2NC + 2C/O -	1NO + 1NC 5NO + 5NC	1NO + 1NC 3NO + 5NC
12NO + 12NO	C 64-pole: Plug connector 24-pole: Plug connector or terminal strip	7NO + 4NC + 2C/O -	5NO + 4NC + 2C/O -	2NO + 5NC 11NO + 11NC	2NO + 5NC 9NO + 11NC
Abbreviations	:: NO = normally-open, NC = normally-close	d, C/O = changeover (No	O/NC)		

#### Order No. suffixes (secondary equipment)

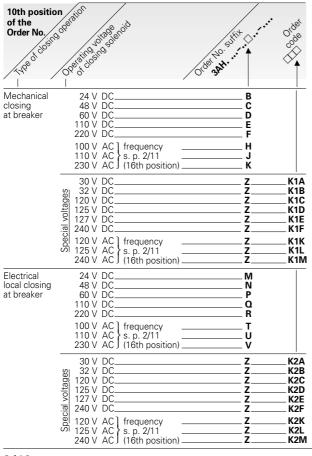
#### Release combinations, varistor circuitry



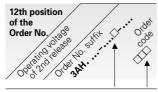
#### Operating voltage of 1st shunt release



#### Type of closing operation and operating voltage of closing solenoid



#### Operating voltage of 2nd release



#### Release as 2nd shunt release current transformer-operated release or undervoltage release

/VΙL	ΠΟUL	. UI	Cui	Terri transi0	pera	iteu j	
ele	ease	re	spe	ctively	0		
	24	٧	DC.		1		
	48	٧	DC.		2		
	60	٧	DC.		3		
	220	٧	DC.		5		
	100	٧	AC	frequency_	6		
	110	٧	AC	}s. p. 2/11 _	7		
	230	٧	AC	J (16th pos.)_	8		
	30	٧	DC		9_	_M1	Α
က္ကု	32	٧	DC.		9_	_M1	В
ğ	120	٧	DC.		9_	_M1	С

က္သု	32 V	DC.		9_	_M1B
ğ	120 V	DC.		9_	_M1C
×	127 V	DC.		9_	_M1E
圆	240 V	DC.		9_	_M1F
Special voltages	120 V	AC	] frequency.	9_	_M1K
ΛĪ	125 V	AC	s. p. 2/11 .	9_	_M1L
	240 V	AC	(16th pos.)	9_	_M1M

#### Release when connected to c.t.-fed, digital overcurrent-time relay type WIP1 (made by SEG)

without protective relay		
24 V DC	_ 9 _	_M2K
with protective relay		
24 V DC	_ 9 _	_мзк



#### Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

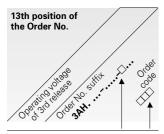
M2[
M2E
M2F
M3E
M3E
M3F

#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

without AN 1901-2	
50/60 Hz 100 / 110 / 230 V AC_ <b>9</b>	_M2G
with AN 1901-2	
50/60 Hz 100 / 110 / 230 V AC_ <b>9</b>	_M3G

#### Continued

## Operating voltage of 3rd release

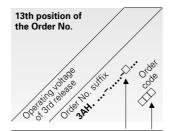


## Release as current transformer-operated release or undervoltage release

without or current transfop		ed	
24 V DC	. 1		
48 V DC	2		
60 V DC	3		
110 V DC	1		
220 V DC			
· · · · · · · · · · · · · · · · · · ·	-		
100 V AC   frequency_	- 6		
110 V AC \ see	. 7		
230 V AC 16th pos.	Ŕ		
200 1 710 3 1411			
			_
30 V DC	9	N 1	A
30 V DC			
	9_	N 1	В
	9_	N 1	B
	9 9 9	N1 N1 N1	BCD
	9 9 9	N1 N1 N1 N1	B C D E
	9 9 9	N1 N1 N1	B C D E
	9 9 9 9	N1 N1 N1 N1 N1	B C D E F
32 V DC   120 V DC   125 V DC   127 V DC   127 V DC   120 V AC   frequency   120 V AC   f	9 9 9 9	N1 N1 N1 N1 N1	B C D E F K
9 32 V DC 9 120 V DC 125 V DC 9 127 V DC 240 V DC 120 V AC   frequency 9 125 V AC   see	9_	N1 N1 N1 N1 N1 N1	BCDEFKL
32 V DC   120 V DC   125 V DC   127 V DC   127 V DC   120 V AC   frequency   120 V AC   f	9_	N1 N1 N1 N1 N1 N1	BCDEFKL

# Release when connected to c.t.-fed, digital overcurrent-time relay type WIP 1 (made by SEG)

without protective relay		
24 V DC	_ 9 _	_N2K
with protective relay		
24 V DC	_ 9	_N3K



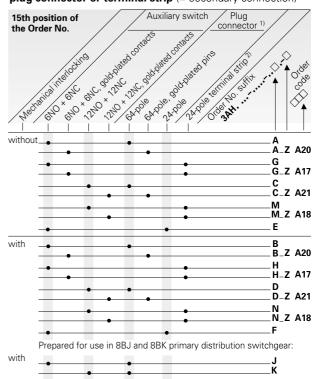
#### Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

without AN 1902		
60 V DC 110 V DC 220 V DC	9	N2D N2E N2F
with AN 1902		
60 V DC 110 V DC 220 V DC		N3D N3E N3F

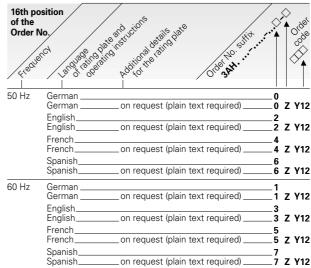
Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

without AN 1901-2		
50/60 Hz 100 / 110 / 230 V AC _	_ 9	N2G
with AN 1901-2		
50/60 Hz 100 / 110 / 230 V AC	9	N3G

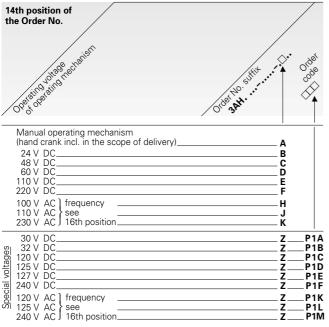
## Mechanical interlocking, auxiliary switch, plug connector or terminal strip (= secondary connection)



#### System frequency, language



## Operating voltage of operating mechanism



Depending on the accessories fitted, spare terminals remain on the 64-pole plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes.

Prefabricated cables are available

as accessories

 Auxiliary switch contacts are not wired on the terminal strip and can therefore be connected directly.

#### Accessories and spare parts

#### Installation parts

When releases / solenoids are being retrofitted, the Order Nos. of the installation parts must also be stated. With other types of additional equipment, the required installation parts are included in the delivery.

#### Spare parts

When releases / solenoids are required as spare parts, the Order No. and design of the appropriate standard circuit-breaker must be stated.

Fixings elements, installation instructions or circuit diagrams are supplied with all spare parts, if required.

#### **Ordering note**

The order numbers are applicable to standard circuitbreakers of current manufacture. When installation or spare parts are being ordered for an existing standard circuit-breaker, always quote the serial No. of the breaker (see "Rating plate" on page 1/3) in order to be certain of obtaining the correct items.

#### Accessories for the plug connector

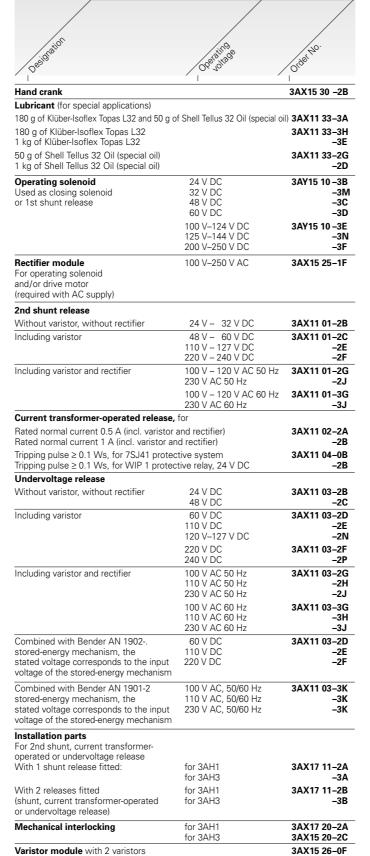
Included in the scope of delivery for the standard circuit-breaker's basic version:

#### 24-pole

- Lower plug part
- Crimp sockets acc. to number of contacts
- Upper plug part with screw contacts (no crimp sockets necessary)

#### 64-pole

- Lower plug part
- Upper plug part
- Crimp sockets acc.to number of contacts





Stored-energy mechanism

For delayed tripping of undervoltage releases

Type AN 1901-2B, Make Bender drop-out delay of approx. 1/1.8/2.5 s

> Type AN 1902-1B. drop-out delay of approx. 0.5 / 0.9 / 1.5 s Type AN 1902-2B, drop-out delay of approx. 0.5 / 0.9 / 1.5 s Type AN 1902-3B, drop-out delay of approx. 0.5 / 0.9 / 1.5 s

Digital, c.t.-fed overcurrent-time relay,

Make SEG, type WIP 1

Drive For 3AH1 motor

For 3AH3

Contactor type 3TH20 22-7 For anti-pumping

Position switch type 3SE4

(as spare part), without mounting accessories Used for:

- Electrical anti-pumping (-S3)
- Mechanical anti-pumping (-S10, -S11) - Motor control (-S21, -S22)
- Closing spring charged (-S41, -S42)
- Breaker tripping signal (-S6, -S7)
   Electrical local closing (-S14, -S15)
- Mechanical interlocking (-S12)

## Auxiliary switch (-S1)

Cable harness with 10 leads

Connection:

Auxiliary switch to 64-pole plug connector Auxiliary switch to 24-pole plug connector Auxiliary switch to 24-pole terminal strip

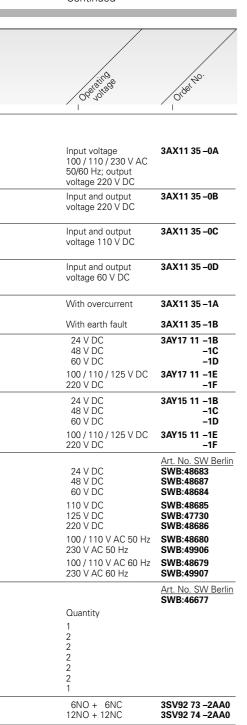
Accessories for plug connector

(for conductor cross-section 1.5 mm²) Crimp pins 24-pole For lower plug part 64-pole 64-pole Crimp sockets

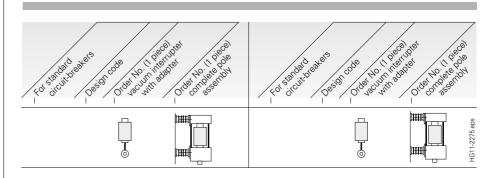
For upper plug part

Crimping tool For notching the crimp pins and crimp sockets

#### Continued



Spare vacuum interrupters or pole assemblies (complete) for deliveries as of January 1998



#### For 3AH1 standard circuit-breaker

3AH1 053 –1	1E	-	3AY17 13 -1A
–2	1E	-	-1B
3AH1 054 -1 -2 -4 -6	1E 1E 1E 1G	- 3AY17 12 -1E -1F	3AY17 13 –1A –1B –
3AH1 055 –2	1E	3AY17 12 –1E	-
–4	1E	–1E	-
–6	1G	–1F	-
3AH1 056	1G	3AY17 12 -1F	_
3AH1 104 –1	1E	-	3AY17 13 -1C
–2	1E		-1D
3AH1 105 –1	1E		3AY17 13 -1C
–2	1E		-1D
3AH1 113 –1	1E		3AY17 13 -1A
–2	1E		-1B
3AH1 114 –1 –2 –4 –6	1E 1E 1E 1G	- 3AY17 12 -1E -1F	3AY17 13 –1A –1B –
3AH1 115 –2	1E	3AY17 12 –1E	-
–4	1E	–1E	-
–6	1G	–1F	-
3AH1 116	1G	3AY17 12 -1F	-
3AH1 154 –1	1E		3AY17 13 -1C
–2	1E		-1D
3AH1 163 –1	1E	-	3AY17 13 -1C
–2	1E		-1D
3AH1 164 –1	1E	<u>-</u>	3AY17 13 -1C
–2	1E		-1D
-4	1E	3AY17 12 –1E	-
-6	1G	–1F	

3AH1 165 –2 –4 –6	1E	3AY17 12 -1E -1E -1F	- - -
3AH1 166	1G	3AY17 12 -1F	-
3AH1 204 –1			3AY17 13 -1C -1D
3AH1 213 –1			3AY17 13 -1C -1D
3AH1 214 -1 -2 -4	1E	- - -	3AY17 13 -1C -1D
-4 -6		3AY17 12 –1F –1F	_
3AH1 215	1G	3AY17 12-1F	-
3AH1 216	1G	3AY17 12 -1F	-
3AH1 252 –1 –2			3AY17 13 -1E -1F
3AH1 253	1H	3AY17 12-1B	-
3AH1 254	1H	3AY17 12 -1B	_
3AH1 262 –1			3AY17 13 –1E –1F
3AH1 263	1H	3AY17 12-1B	-
3AH1 264	1H	3AY17 12-1B	-
3AH1 273 –1	. –		3AY17 13 –1G –1H
3AH1 274 -1 -2		_	3AY17 13 –1G –1H
3AH1 283 –1 –2			3AY17 13 -1G -1H
3AH1 284 –1 –2			3AY17 13 -1G -1H

#### For 3AH3 standard circuit-breaker

3AH3 057	1J	3AY17 15 -1J	
3AH3 078 -2	1J	3AY17 15 -1J	_
-6	1J	-1J	-
-7	1J	-1J	-
	1J	-4J	
3AH3 117	1J	3AY17 15 -1J	
3AH3 128 -2	1J	3AY17 15 -1J	_
-6	1J	-1J	_
-7	1J	-1J	-
-8	1J	-4J	-
3AH3 167	1J	3AY17 15 -1J	_
3AH3 178 -2	1J	3AY17 15 -1J	_
-6	1J	-1J	-

	IJ <b>3AY17 15</b> -	-1J – -4J –
3AH3 217	1J <b>3AY17 15 -</b>	-1J –
-6 -7	1J -	-1J – -1J – -1J – -4J –
3AH3 266 -6	1M <b>3AY17 15</b> -	-1M –
3AH3 305	IL 3AY17 15 -	-1L –
3AH3 306	1M <b>3AY17 15</b> -	-1M –
	IN <b>3AY17 15</b> - IN -	-1N – -2N –

Vacuum interrupters are delivered with differing accessories – depending on the type of standard circuit-breaker – in order to make replacement of vacuum interrupters as simple as possible.

#### Variants:

3AX11 34 -2D -2B

3AX11 34 -3A

3AX11 34 -3C

3AX11 34 -3D

-3B

1 set = 24 pcs

1 set = 64 pcs

1 set = 64 pcs

- Vacuum interrupter with adapter
- Vacuum interrupter as complete pole assembly including post insulators

For the selection of the correct spare vacuum interrupter, it is necessary to state the design code and the serial No. of the standard circuit-breaker. Both are stated on the rating plate of the standard circuit-breaker.

## 7.2 to 36 kV



Arc furnace of a steelworks

Catalog section 3

Ordering data, examples for order	ring	3/2
Selection and ordering data for - 7.2 kV - 12 kV - 15 kV - 17.5 kV - 24 kV - 36 kV		3/3 3/4 3/5 3/6 3/7 3/8
Secondary equipm - Selection - Order No. suffixes	3/10,	3/9 3/11
Accessories and		

spare parts

3/12, 3/13

#### Features of frequent-operation circuit-breakers

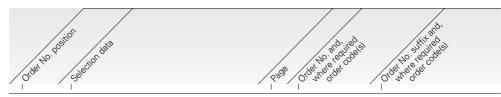
- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life
- For 3AH2 frequent-operation circuit-breakers, 60,000 operating cycles
- For 3AH4 frequent-operation circuit-breakers, 120,000 operating cycles
- Rated short-circuit breaking currents up to 40 kA (r.m.s. value), minimum 50 operating cycles
- DC component 36 %, higher values on request
- Switching capacitiy at a rated normal current of up to 2500 A, 30,000 operating cycles
- Values of transient recovery voltage acc. to IEC 60 056, other values on request
- Upright installation (standard), reclined installation for 3AH4 frequent-operation circuit-breakers, to be ordered with order code "A70"
- Suitable for use in conjunction with, for example:
- CapacitorsFilter circuits
- Motors
- Reactors (individual protection circuitry required)
  Especially suitable for operating arc furnaces
- (individual protection circuitry also required)
- Generators (frequent operation)

#### Ordering data, examples for ordering

#### **Ordering data**

The 3AH2 / 3AH4 frequentoperation circuit-breakers are determined by a 16-digit Order No. According to the equipment fitted to the frequent-operation circuit-breakers, this Order No. must be suffixed by one or more order codes.

- For selection and ordering data of the primary equipment with additional equipment see pages 3/3 to 3/8.
- For associated Order No. suffixes (secondary equipment) see pages 3/10 and 3/11.



1st to 8th	3AH2 frequent-operation circuit-breaker		I
position	<ul> <li>For mechanical breaker service life 60,000 operating cycles</li> <li>Rated voltage U<sub>r</sub> 7.2 kV</li> <li>Rated short-circuit breaking current I<sub>s</sub></li> <li>Rated lightning impulse withstand voltage U<sub>p</sub> 60 kV</li> <li>Pole-centre distance 210 mm</li> <li>Rated normal current I<sub>r</sub> 2000 A</li> <li>Additional equipment:</li> <li>Primary current paths, tinned (for special ambient conditions)</li> </ul>	3/3 <b>3 A H 2 0 5 5</b> -	
9th position	Closing solenoid, 1st shunt release,		
	varistor circuitry and 2nd shunt release	3/10	N
10th position	Mechanical local closing, closing solenoid operating voltage 60 V DC	3/10	D
11th position	1st shunt release operating voltage 110 V DC	3/10	<b>4</b> <del>-</del> .
12th position	2nd release (undervoltage) operating voltage 220 V DC		
13th position	Without 3rd release	3/11	0
14th position	Operating mechanism voltage 110 V AG	3/11	<b>-</b> . <b>J -</b>
15th position	Without mechanical interlocking, auxilia 12NO + 12NC in special design with go contacts and 64-pole plug connector in design with gold-plated pins.	v switch I-plated pecial	
16th position	System frequency 50 Hz, rating plate and operating instructions in French	3/11	<b>4 -</b>
When ordering		rder No. 3 A H 2 0 5 5 - rder codes D 1 1 + A 2 1	- 4 N D 4 5 - 0 J C 4 - Z

#### 2nd example for ordering

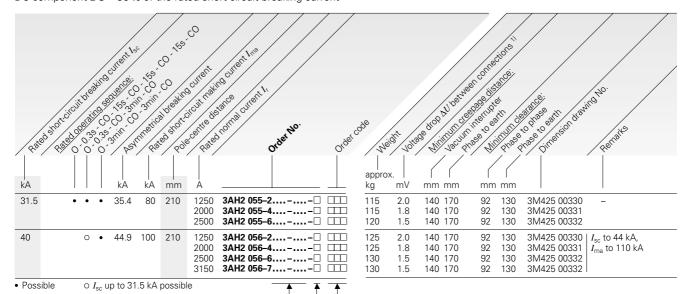
16th position	2nd release (undervoltage) operating voltage 220 V DC Without 3rd release Operating mechanism voltage 110 V A Without mechanical interlocking, auxiliary switch 12NO + 12NC, 64-pole plug connector System frequency 50 Hz, rating plate and operating instructions in French	3/11_ AC3/11_ 3/11_				0 J .	  :	
	operating voltage 220 V DC	3/11 AC3/11				. – 0 . – . J .	 	
15th position	operating voltage 220 V DC	3/11				0		
14th position	operating voltage 220 V DC Without 3rd release	3/11				0		
13th position	operating voltage 220 V DC							
12th position	Ond release (underveltere)							
11th position	1st shunt release operating voltage 110 V DC	3/10			4			
10th position	Mechanical local closing, closing solenoid operating voltage 60 V DC	3/10			D .			
9th position	Closing solenoid, 1st shunt release, varistor circuitry and 2nd shunt relase	3/10			. N			
	Additional equipment: Rated short-time lightning impulse wit $U_p = 185 \text{ kV}$ instead of 170 kV	hstand voltage 3/8					. – Z	E 1 4
1st to 8th position	3AH4 frequent-operation circuit-breake For mechanical service life 120,000 or Rated voltage U <sub>T</sub> 36 kV Rated short-circuit breaking current u Rated lightning impulse withstand vo Pole-centre distance 350 mm Rated normal current I <sub>T</sub> 2500 A	operating cycles $U_{\rm sc}$ 40 kA oltage $U_{\rm p}$ 170 kV	_3 A H 4	306-	6			

7.2 kV

Rated voltage  $U_r$  7.2 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **60 kV** Rated short-time power frequency withstand voltage  $U_{\rm d}$  **20 kV** (up to 32 kV see "Additional equipment")

DC component DC = 36 % of the rated short-circuit breaking current



Order No. suffixes of secondary equipment see pages 3/10 and 3/11.

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10 Z A20
Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	Z A21
Condensation protection, heating for 230 V AC	Z A30
Silicone-free design	Z A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG _	
Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	Z A46
Additional rating plate provided separately	Z B00
Primary current paths silver-plated for external terminals and internal connections on both sides	Z D10 Z D11
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 32 kV instead of 20 kV	Z E16
Routine test certificate	Z F20
Hand crank (also with motor-operated mechanism)	
for manual charging of the closing spring in the vacuum circuit-breaker	Z F30
Special designs (not as per catalog): Additionally state desired design in plain text	Z Y99

#### Values of transient recovery voltage

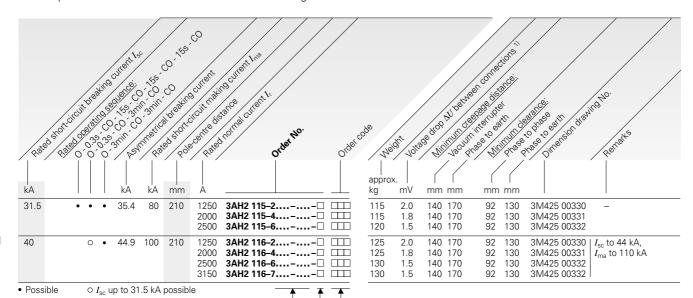
- Acc. to IEC 60 056
- Voltage (TRV) 12.3 kV peak value
- Rate of rise (RRRV) 0.24 kV/µs

1) According to IEC 60 694 with 100 A DC.

Rated voltage  $U_r$  12 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **75 kV** Rated short-time power frequency withstand voltage  $U_{\rm d}$  **28 kV** (up to 42 kV see "Additional equipment")

DC component **DC = 36 %** of the rated short-circuit breaking current



Order No. suffixes of secondary equipment

see pages 3/10 and 3/11

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-platedAuxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	
Condensation protection, heating for 230 V AC	Z A30 Z A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	
Additional rating plate provided separately	Z B00
Primary current paths silver-plated for external terminals and internal connections on both sides Primary current paths tinned for special ambient conditions	Z D10 Z D11
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 42 kV instead of 28 kV	Z E13
Routine test certificate Hand crank (also with motor-operated mechanism)	_ Z F20

for manual charging of the closing spring in the vacuum circuit-breaker\_

Special designs (not as per catalog): Additionally state desired design in plain text \_\_\_\_

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 20.6 kV peak value
- Rate of rise (RRRV) 0.34 kV/μs

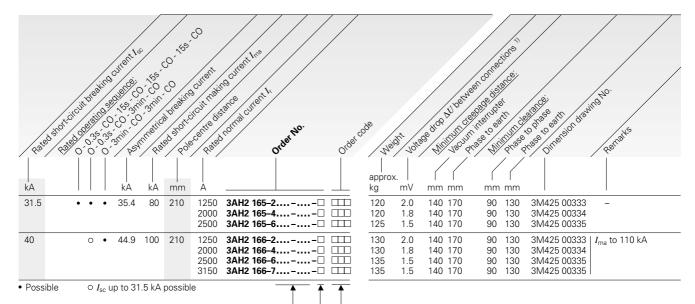
1) According to IEC 60 694 with 100 A DC.

15 kV

Rated voltage  $U_r$  15 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **95 kV**Rated short-time power frequency withstand voltage  $U_{\rm d}$  **36 kV** (up to 42 kV see "Additional equipment")

DC component **DC = 36 %** of the rated short-circuit breaking current



#### Order No. suffixes of secondary equipment

see pages 3/10 and 3/11.

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated	Z A20
Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	Z A21
Condensation protection, heating for 230 V AC	Z A30
Silicone-free design	Z A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG _ Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	
Additional rating plate provided separately	Z B00
Primary current paths silver-plated for external terminals and internal connections on both sides Primary current paths tinned for special ambient conditions	Z D10 Z D11
Rated short-time power frequency withstand voltage $U_d$ = 42 kV instead of 36 kV	Z E13
Routine test certificate	Z F20
Hand crank (also with motor-operated mechanism)	
for manual charging of the closing spring in the vacuum circuit-breaker	Z F30

Special designs (not as per catalog): Additionally state desired design in plain text

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 25.7 kV peak value
- Rate of rise (RRRV) 0.38 kV/µs

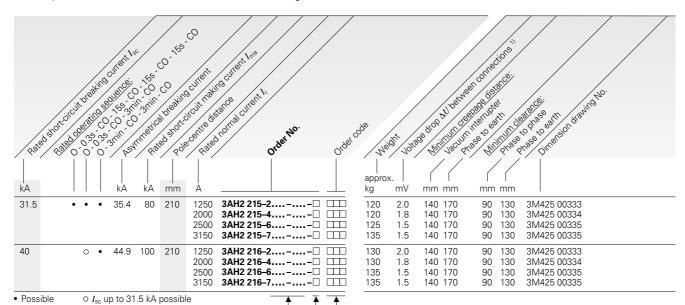
<sup>1)</sup> According to IEC 60 694 with 100 A DC.

17.5 kV

Rated voltage  $U_r$  17.5 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **95 kV** Rated short-time power frequency withstand voltage  $U_{\rm d}$  **38 kV** (up to 42 kV see "Additional equipment")

DC component **DC = 36 %** of the rated short-circuit breaking current



Z V99

Order No. suffixes of secondary equipment see pages 3/10 and 3/11

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	z	A10 A20 A21
Condensation protection, heating for 230 V AC		A30 A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz		A45 A46
Additional rating plate provided separately	z	B00
Primary current paths silver-plated for external terminals and internal connections on both sides Primary current paths tinned for special ambient conditions		D10 D11
Rated short-time power frequency with stand voltage $U_{\rm d}$ = 42 kV instead of 38 kV	z	E13
Routine test certificate Hand crank (also with motor-operated mechanism)		F20
for manual charging of the closing spring in the vacuum circuit-breaker	z	F30

Special designs (not as per catalog): Additionally state desired design in plain text.

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 30 kV peak value
- Rate of rise (RRRV) 0.42 kV/µs

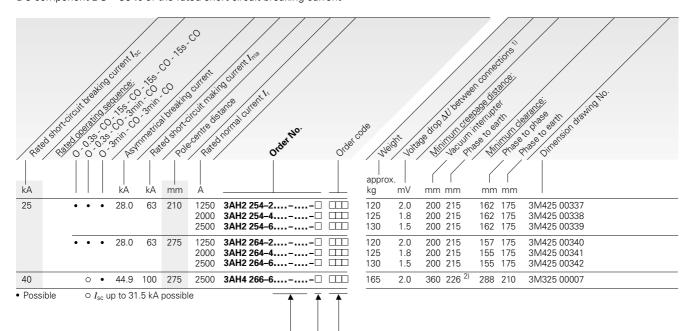
1) According to IEC 60 694 with 100 A DC.

24 kV

Rated voltage  $U_r$  24 kV

Rated lightning impulse with stand voltage  $U_{\rm p}$  125 kV Rated short-time power frequency with stand voltage  $U_{\rm d}$  50 kV

DC component DC = 36 % of the rated short-circuit breaking current



Z F30

#### Order No. suffixes of secondary equipment

see pages 3/10 and 3/11.

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables		A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated		A20 A21
Condensation protection, heating for 230 V AC		A30 A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG		A45 A46
Vacuum circuit-breaker for reclined installation (only with 3AH4 frequent-operation circuit-breakers) _	_ <b>Z</b>	A70
Additional rating plate provided separately	_ <b>Z</b>	B00
Primary current paths silver-plated for external terminals and internal connections on both sides		D10 D11
Routine test certificate	_ <b>Z</b>	F20

for manual charging of the closing spring in the vacuum circuit-breaker\_

Special designs (not as per catalog): Additionally state desired design in plain text \_\_\_

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 41 kV peak value
- Rate of rise (RRRV) 0.47 kV/µs

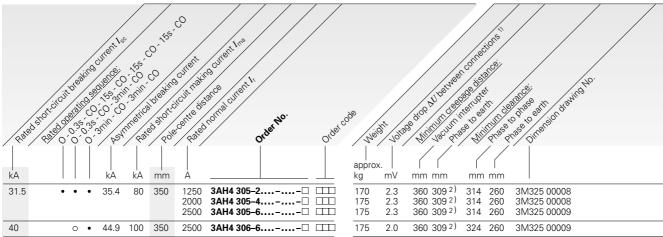
<sup>1)</sup> According to IEC 60 694 with 100 A DC.

<sup>2)</sup> Minimum creepage distance via operating rod.

36 kV

Rated voltage  $U_r$  36 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **170 kV** (up to 185 kV see "Additional equipment") Rated short-time power frequency withstand voltage  $U_{\rm d}$  **70 kV** (up to 85 kV see "Additional equipment") DC component **DC = 36 %** of the rated short-circuit breaking current



• Possible  $\circ$   $I_{\rm sc}$  up to 31.5 kA possible Order No. suffixes of secondary equipment see pages 3/10 and 3/11

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables  Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated  Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	_ <b>Z</b>	A10 A20 A21
Condensation protection, heating for 230 V AC	_	A30 A31
Current transformer-operated release (tripping pulse $\geq$ 0.1 Ws) for protective relay made by SEG Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz		A45 A46
Vacuum circuit-breaker for reclined installation (only with 3AH4 frequent-operation circuit-breakers)	_ <b>Z</b>	A70
Additional rating plate provided separately	_ <b>z</b>	B00
Primary current paths silver-plated for external terminals and internal connections on both sides		D10 D11
Rated lightning impulse withstand voltage $U_{\rm p}=185~{\rm kV}$ instead of 170 kV Rated short-time power frequency withstand voltage $U_{\rm d}=85~{\rm kV}$ instead of 70 kV		E14 E15
Routine test certificate	_ <b>z</b>	F20
Hand crank (also with motor-operated mechanism) for manual charging of the closing spring in the vacuum circuit-breaker	_ <b>Z</b>	F30

Special designs (not as per catalog): Additionally state desired design in plain text \_

## Values of transient recovery voltage

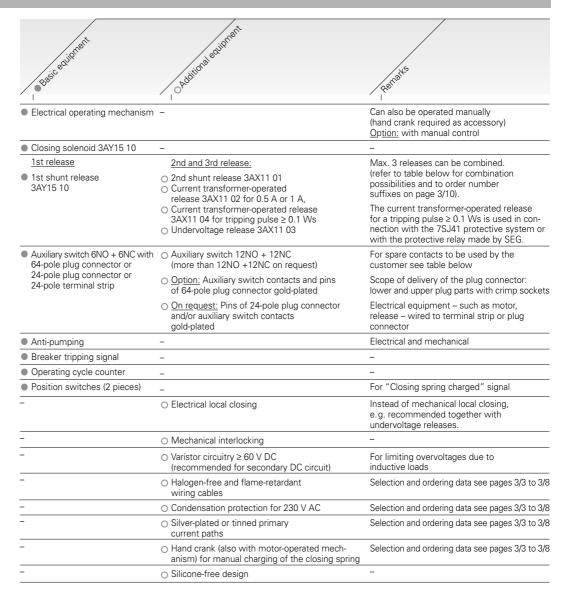
- Acc. to IEC 60 056
  - Voltage (TRV)62 kV peak value
- Rate of rise (RRRV) 0.57 kV/μs

<sup>1)</sup> According to IEC 60 694 with 100 A DC.

Minimum creepage distance via operating rod.

#### Secondary equipment

## Basic equipment, additional equipment



# Combination possibilities of the releases

2	/	Release	combinations	
Registration of the second of	1	/2	\mathrew{3}	
1st shunt release	•	•	•	
2nd release (shunt release, undervoltage release or current transformer-operated release)	_	•	•	
3rd release (shunt release, undervoltage release or current transformer-operated release)	_	-	•	

• 1 piece per release. A maximum of 3 releases can be combined.

# Auxiliary switch contacts which can be used by the customer

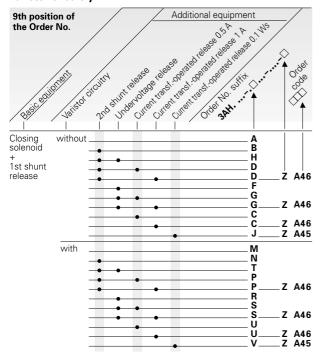
Depending on the accessories fitted, spare terminals remain on the plug connector.
 The customer may connect them to spare auxiliary switch contacts as he wishes. Prefabricated cables are available as accessories.

	Spare contacts to be us	sed by the customer			
Autiliary Che	John de Fried Strick	And the property of the proper	/	Available of smith	
	'	With basic equipment:	With maximum equipment:	With basic equipment:	With maximum equipment:
6NO + 6NC	64-pole: Plug connector 24-pole: Plug connector or terminal strip	2NO + 2NC + 2C/O -	2NC + 2C/O -	1NO + 1NC 5NO + 5NC	1NO + 1NC 3NO + 5NC
12NO + 12NO	C 64-pole: Plug connector 24-pole: Plug connector or terminal strip	7NO + 4NC + 2C/O -	5NO + 4NC + 2C/O -	2NO + 5NC 11NO + 11NC	2NO + 5NC 9NO + 11NC

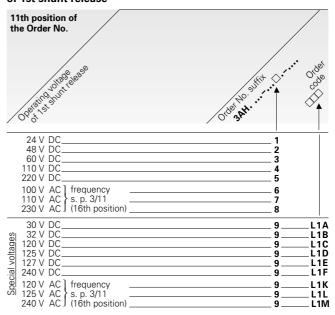
Abbreviations: NO = normally-open, NC = normally-closed, C/O = changeover (NO/NC)

#### Order No. suffixes (secondary equipment)

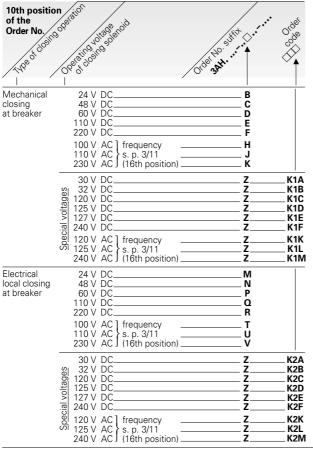
#### Release combinations, varistor circuitry



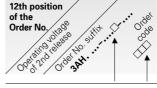
#### Operating voltage of 1st shunt release



#### Type of closing operation and operating voltage of closing solenoid



#### Operating voltage of 2nd release



#### Release as 2nd shunt release current transformer-operated release or undervoltage release

vithout or current transfoperated elease respectively0	
24 V DC <b>1</b> 48 V DC <b>2</b>	
60 V DC <b>3</b> 110 V DC <b>4</b>	
220 V DC <b>5</b>	
100 V AC \ \text{frequency - 6} \\ 110 V AC \ \ \text{s. p. 3/11 - 7} \\ 230 V AC \ \ (16th pos.) - 8	
30 V DC9M1	Α

#### Release when connected to c.t.-fed, digital overcurrent-time relay type WIP1 (made by SEG)

without protective relay	•	
24 V DC	_ 9 _	_M2K
with protective relay		
24 V DC	_ 9 _	_M3K



#### Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

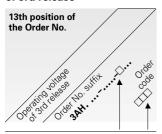
Without AN 1902		
60 V DC	9_	_M2D
110 V DC	9_	M2E
220 V DC	9 _	M2F
with AN 1902		
60 V DC	9_	_M3D
110 V DC		M3E
220 V DC	9_	M3F

#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

without AN 1901-2			
50/60 Hz 100 / 110 / 230 V	Δ٢	a	Mag
with AN 1901-2	Αυ_	_ 3 _	
50/60 Hz 100 / 110 / 230 V	AC	9	M3G

#### Continued

## Operating voltage of 3rd release



## Release as current transformer-operated release or undervoltage release

	_		
without or current transfop release respectively24 V DC48 V DC60 V DC	. 1	ated	
110 V DC	4		
220 V DC	- 6		
30 V DC 32 V D	9 9 9 9	N1 N1 N1 N1 N1 N1	B C D E F K L

#### Release when connected to c.t.-fed, digital overcurrent-time relay type WIP 1 (made by SEG)

without protective relay		
24 V DC	_ 9	_ N2K
with protective relay		
24 V DC	_ 9	_N3K

# 13th position of the Order No.

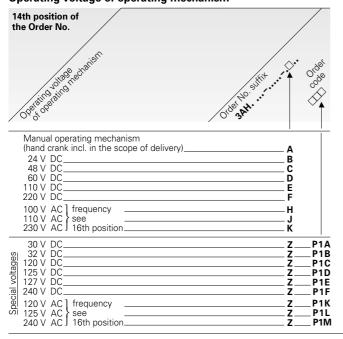
# Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

without AN 1902	
60 V DC 110 V DC 220 V DC	
with AN 1902	
60 V DC 110 V DC 220 V DC	9 N3D 9 N3E 9 N3F

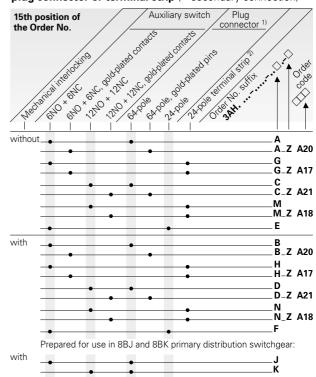
#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

		without AN 1901-2
_N2G	_9_	50/60 Hz 100 / 110 / 230 V AC_
		with AN 1901-2
_N3G	_ 9	50/60 Hz 100 / 110 / 230 V AC_

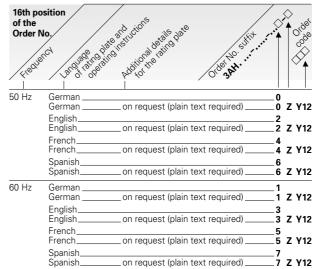
#### Operating voltage of operating mechanism



## Mechanical interlocking, auxiliary switch, plug connector or terminal strip (= secondary connection)



#### System frequency, language



Depending on the accessories fitted, spare terminals remain on the 64-pole plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes.

Prefabricated cables are available

as accessories

 Auxiliary switch contacts are not wired on the terminal strip and can therefore be connected directly.

#### Accessories and spare parts

#### Installation parts

When releases / solenoids are being retrofitted, the Order Nos. of the installation parts must also be stated. With other types of additional equipment, the required installation parts are included in the delivery.

#### Spare parts

When releases / solenoids are required as spare parts, the Order No. and design of the appropriate frequentoperation circuit-breaker must be stated.

Fixings elements, installation instructions or circuit diagrams are supplied with all spare parts, if required.

#### **Ordering note**

The order numbers are applicable to frequentoperation circuit-breakers of current manufacture. When installation or spare parts are being ordered for an existing frequent-operation circuitbreaker, always quote the serial No. of the breaker (see "Rating plate" on page 1/3) in order to be certain of obtaining the correct items.

#### Accessories for the plug connector

Included in the scope of delivery for the frequent-operation circuitbreaker's basic version:

#### 24-pole

- Lower plug part
- Crimp sockets acc. to number of contacts
- Upper plug part with screw contacts (no crimp sockets necessary)

#### 64-pole

- Lower plug part
- Upper plug part
- Crimp sockets acc. to number of contacts



Lubricant (for special applications)		
180 g of Klüber-Isoflex Topas L32 and 50	g of Shell Tellus 32 Oil (special oil)	3AX11 33-3A
180 g of Klüber-Isoflex Topas L32 1 kg of Klüber-Isoflex Topas L32		3AX11 33-3H -3E
50 g of Shell Tellus 32 Oil (special oil) 1 kg of Shell Tellus 32 Oil (special oil)		3AX11 33-2G -2D
Operating colonoid	24 V DC	3AV15 10 _3R

rkg of Stiell Tellus 32 Oil (special oil)		-20
Operating solenoid	24 V DC	3AY15 10 -3B
Used as closing solenoid	32 V DC	-3M
or 1st shunt release	48 V DC 60 V DC	−3C −3D
	100 V-124 V DC 125 V-144 V DC 200 V-250 V DC	3AY15 10 –3E –3N –3F
Rectifier module	100 V-250 V AC	3AX15 25-1F

For operating solenoid and for drive motor (required with AC supply)

2nd shunt release		
Without varistor, without rectifier	24 V - 32 V DC	3AX11 01-2B
Including varistor	48 V - 60 V DC	3AX11 01-2C
	110 V – 127 V DC	-2E
	220 V – 240 V DC	-2F
Including varistor and rectifier	100 V - 120 V AC 50 Hz	3AX11 01-2G
-	230 V AC 50 Hz	-2J
	100 V – 120 V AC 60 Hz 230 V AC 60 Hz	3AX11 01-3G -3J

Current transformer-operated release, for	
Rated normal current 0.5 A (incl. varistor and rectifier) Rated normal current 1 A (incl. varistor and rectifier)	3AX11 02-2A -2B
Tripping pulse ≥ 0.1 Ws, for 7SJ41 protective system Tripping pulse ≥ 0.1 Ws, for WIP 1 protective relay, 24 V DC	3AX11 04-0B -2B

Undervoltage release		
Without varistor, without rectifier	24 V DC 48 V DC	3AX11 03-2B -2C
Including varistor	60 V DC 110 V DC 120 V-127 V DC	3AX11 03-2D -2E -2N
	220 V DC 240 V DC	3AX11 03-2F -2P
Including varistor and rectifier	100 V AC 50 Hz 110 V AC 50 Hz 230 V AC 50 Hz	3AX11 03-2G -2H -2J
	100 V AC 60 Hz 110 V AC 60 Hz 230 V AC 60 Hz	3AX11 03–3G –3H –3J
Combined with Bender AN 1902 stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism	60 V DC 110 V DC 220 V DC	3AX11 03-2D -2E -2F
Combined with Bender AN 1901-2 stored-energy mechanism, the stated voltage corresponds to the input	100 V AC, 50/60 Hz 110 V AC, 50/60 Hz 230 V AC, 50/60 Hz	3AX11 03-3K -3K -3K

stated voltage corresponds to the input voltage of the stored-energy mechanism	230 V AC, 50/60 Hz	-3K
Installation parts For 2nd shunt, current transformer- operated or undervoltage release:		
With 1 shunt release fitted	for 3AH2 for 3AH4	3AX17 11–2A –3A
With 2 releases fitted (shunt, current transformer-operated or undervoltage release)	for 3AH2 for 3AH4	3AX17 11–2B –3B
Mechanical interlocking	for 3AH2 for 3AH4	3AX17 20-2A 3AX15 20-2C
Varistor module with 2 varistors		3AX15 26-0F

Securing elements, e.g. spring washers 1 set per frequentand split pins for circuit-breaker inspections operation circuit-breaker



Stored-energy mechanism

for delayed tripping of undervoltage releases

Type AN 1901-2B, Make drop-out delay Bender of approx. 1 / 1.8 / 2.5 s

> Type AN 1902-1B, drop-out delay of approx. 0.5 / 0.9 / 1.5 s Type AN 1902-2B, drop-out delay of approx. 0.5 / 0.9 / 1.5 s Type AN 1902-3B, drop-out delay

of approx. 0.5 / 0.9 / 1.5 s

Digital, c.t.-fed overcurrent-time relay,

as release Make SEG, type WIP 1

Drive For 3AH2 motor

For 3AH4

Contactor type 3TH20-227

Position switch type 3SE4

(as spare part), without mounting accessories Used for:

- Electrical anti-pumping (-S3)
- Mechanical anti-pumping (-S10, -S11)
- Motor control (-S21, -S22)
- Closing spring charged (-S41, -S42) - Breaker tripping signal (-S6, -S7)
- Electrical local closing (-S14, -S15)
- Mechanical interlocking (-S12)

#### Auxiliary switch (-S1)

Cable harness with 10 leads

Connection:

Auxiliary switch to 64-pole plug connector Auxiliary switch to 24-pole plug connector Auxiliary switch to 24-pole terminal strip

Accessories for plug connector

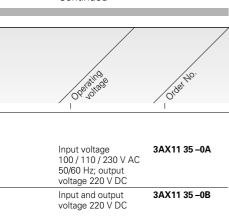
(for conductor cross-section 1.5 mm<sup>2</sup>) Crimp pins 24-pole For lower plug part 64-pole Crimp sockets 64-pole

For upper plug part

3AY15 50 -0A

**Crimping tool** For notching the crimp Make Harting pins and crimp sockets

#### Continued



Input and output voltage 110 V DC	3AX11 35 -0C
Input and output voltage 60 V DC	3AX11 35 -0D
With overcurrent	3AX11 35 -1A
With earth fault	2AY11 25_1R

3AX 11 33 - 1D	vvitii eartii iault
3AY17 11 -1B	24 V DC
-1C	48 V DC
-1D	60 V DC
3AY17 11 -1E	100 / 110 / 125 V DC
-1F	220 V DC
3AY15 11 -1B	24 V DC
-1C	48 V DC
-1D	60 V DC
3AY15 11 -1E	100 / 110 / 125 V DC
-1F	220 V DC
A : A1	

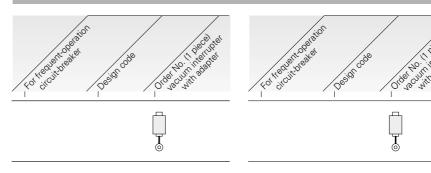
220 V DC	-1F
24 V DC 48 V DC	Art. No. SW Berlin SWB:48683 SWB:48687
60 V DC	SWB:48684
110 V DC	SWB:48685
125 V DC	SWB:47730
220 V DC	SWB:48686
100 / 110 V AC 50 Hz	SWB:48680
230 V AC 50 Hz	SWB:49906
100 / 110 V AC 60 Hz	SWB:48679
230 V AC 60 Hz	SWB:49907

	Art. No. SW Berlin SWB:46677
Quantity	
1	
2	
2	
2	
2	
2	
1	
6NO + 6NC	3SV92 73 -2AA0

12NO + 12NC	3SV92 74 -2AA0
	3AX11 34 -2D -2B -2C
1 set = 24 pcs 1 set = 64 pcs	3AX11 34 -3A -3B
1 set = 64 pcs	3AX11 34 -3C

3AX11 34 -3D

Spare vacuum interrupters or pole assemblies (complete) for deliveries as of January 1998



#### For 3AH2 frequent-operation circuit-breaker

3AY17 12 – 1F	1G	3AH2 05
-1F	1G	3AH2 11
-1 <u>F</u>	1G	3AH2 16
-1F	1G	3AH2 21
3AY17 12 - 1B	1H	3AH2 254
-1B	1H	3AH2 264

As spare parts vacuum interrupters are always supplied with adapter.

For the selection of the correct spare vacuum interrupter, it is necessary to state the design code and the serial No. of the frequentoperation circuit-breaker. Both are stated on the rating plate of the frequent-operation circuit-breaker.

#### For 3AH4 frequent-operation circuit-breaker

3AH4 266	1M	3AY17 15-1M
3AH4 305	1L	-1L
3AH4 306	1M	–1M



Transformer station (Rheingau Elektrizitätswerke GmbH)

Catalog section	on 4 Page
Ordering data, examples for o	rdering 4/2
Selection and ordering data for – 12 kV – 17.5 kV – 24 kV – 36 kV	or 4/3 4/4 4/5 4/6
Secondary equ - Selection - Order No. suffixes	4/7 4/8, 4/9
Accessories an spare parts	d 4/10, 4/11

#### Features of economy circuit-breakers

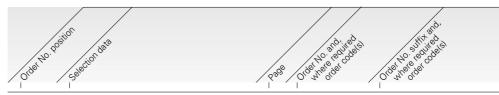
- Rated voltages 12 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 25 kA (r.m.s.value), minimum 25 operating cycles
- DC component 36 %, higher values on request
- Values of transient recovery voltage acc. to IEC 60 056, other values on request
- Upright installation
- <u>User configurable secondary equipment</u>
- Optimum replacement for breakers of conventional design, e.g. low-oil breakers and dead-tank oil circuit-breakers
- Suitable for use in conjunction with, for example:
- Overhead lines and cablesTransformers
- Capacitors
- Filter circuitsMotors

#### Ordering data, examples for ordering

#### **Ordering data**

The 3AH5 economy circuitbreakers are determined by a 16-digit Order No. According to the equipment fitted to the economy circuit-breakers, this Order No. must be suffixed by one or more order codes.

- For selection and ordering data of the primary equipment with additional equipment see pages 4/3 to 4/6.
- For associated Order No. suffixes (secondary equipment) see pages 4/8 and 4/9.



1st to 8th	3AH5 economy circuit-breaker:					
position	$\begin{array}{llllllllllllllllllllllllllllllllllll$	e <i>U</i> <sub>p</sub> 75 kV	3 A H 5	101-1		
9th, 11th +12th position	Without varistor circuitry, without 1st shout current transformer-operated releas	nunt release, se 0.1 Ws_4/8 _			K.00	
10th + 14th position	Manual snap-action operating mechanis with hand crank				. A	Χ.
13th position	Without operating cycle counter, without breaker tripping signal	4/9 _			(	)
15th position	Without mechanical interlocking, with a switch 2NO + 2NC, without plug conne					. A .
16th position	System frequency 60 Hz, rating plate ar operating instructions in English					3
When ordering	atata	Order No.	2 1 11 5	101-1	V A O O O	V A -

#### 2nd example for ordering

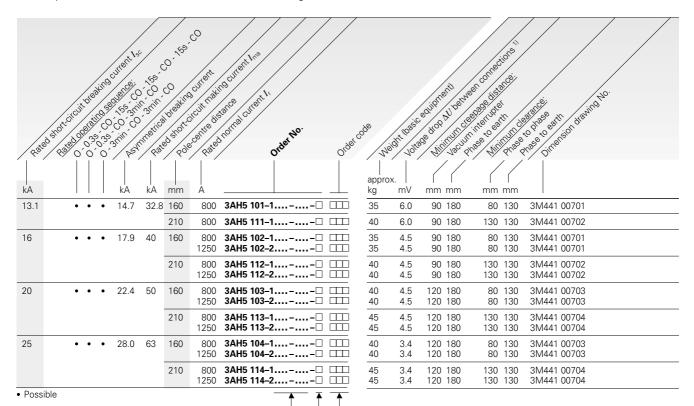
16th position	Without mechanical interlocking, with a switch 6NO + 6NC, with 24-pole termi System frequency 50 Hz, rating plate a operating instructions in English	nal strip4/9 _ ind						2 -	٠	
1046	switch 6NO + 6NC, with 24-pole termi	nal strip4/9 _						. E	٠	
15th position	A litha out manabaniant interlegation or initial	ouvilion (								
13th position	Operating cycle counter	4/9 _					. – 1		٠	
10th + 14th position	Closing solenoid with operating voltage and motor stored-energy mechanism v operating voltage 60 V DC	vith 4/9 _								
11th position	1st shunt release operating voltage 60 V DC	4/8 _				. 3	. – .			
9th + 12th position	Without varistor circuitry, with 1st shur without 2nd release				<i>F</i>	۱	0 – .		٠	
	Hand crank for manual charging of the closing spring	4/3 _							Z F	3 0
	Rated short-time power frequency with $U_{\rm d} = 42~{\rm kV}$ instead of 28 kV	nstand voltage 4/3 _							ZE	1 3
1st to 8th position	3AH5 economy circuit-breaker:  - Rated voltage <i>U<sub>r</sub></i> 12 kV  - Rated short-circuit breaking current <i>I<sub>t</sub></i> - Rated lightning impulse withstand vo  - Pole-centre distance 210 mm  - Rated normal current 1250 A  Additional equipment:	ltage $U_{\rm p}$ 75 kV	_3 A H 5	113	3 – 2 .				٠	

12 kV

Rated voltage  $U_r$  12 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  75 kV Rated short-time power frequency withstand voltage  $U_{\rm d}$  28 kV (up to 42 kV see "Additional equipment")

DC component **DC = 36 %** of the rated short-circuit breaking current



Z Y99

Order No. suffixes of secondary equipment

see pages 4/8 and 4/9

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10 Z A20 Z A21
Condensation protection, heating for 230 V AC	_ Z A30 _ Z A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	
Additional rating plate provided separately	_ Z B00
Rated short-time power frequency withstand voltage $U_{\rm d}$ = 42 kV instead of 28 kV, however only for 3AH5 103, 3AH5 113, 3AH5 104 and 3AH5 114 economy circuit-breakers	_ Z E13
Routine test certificate Hand crank (also with motor-operated mechanism)	_ Z F20
for manual charging of the closing spring in the vacuum circuit-breaker	_ Z F30

Special designs (not as per catalog): Additionally state desired design in plain text \_

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 20.6 kV peak value
- Rate of rise (RRRV) 0.34 kV/μs

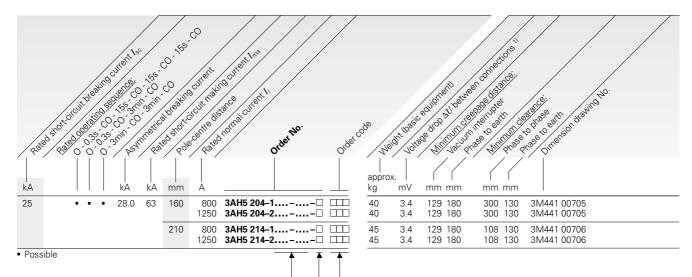
<sup>1)</sup> According to IEC 60 694 with 100 A DC.

17.5 kV

Rated voltage  $U_{\rm r}$  17.5 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  **95 kV** Rated short-time power frequency withstand voltage  $U_{\rm d}$  **38 kV** (up to 42 kV see "Additional equipment")

DC component **DC = 36 %** of the rated short-circuit breaking current



Order No. suffixes of secondary equipment see pages 4/8 and 4/9

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10
Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated	Z A20
Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated	_ Z A21
Condensation protection, heating for 230 V AC	Z A30
Silicone-free design	_ Z A31
Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG	Z A45
Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz	
Additional rating plate provided separately	_ Z B00
Rated short-time power frequency withstand voltage $U_d = 42 \text{ kV}$ instead of 38 kV	_ Z E1
Routine test certificate	_ Z F20
Hand crank (also with motor-operated mechanism)	
for manual charging of the closing spring in the vacuum circuit-breaker	_ Z F30

Special designs (not as per catalog): Additionally state desired design in plain text \_

#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 30 kV peak value
- Rate of rise (RRRV) 0.42 kV/μs

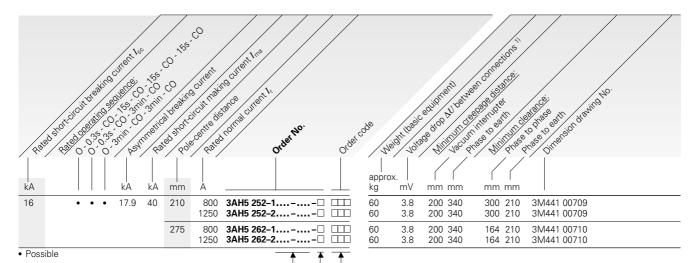
1) According to IEC 60 694 with 100 A DC.

24 kV

Rated voltage  $U_r$  24 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  125 kV Rated short-time power frequency withstand voltage  $U_{\rm d}$  50 kV

DC component DC = 36 % of the rated short-circuit breaking current



Z F30

Z Y99

Order No. suffixes of secondary equipment see pages 4/8 and 4/9

## Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables Z A10 Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated Z A20 Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated Z A21 Condensation protection, heating for 230 V AC. Z A30 Z A31 Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz Z A45 Z A46 Z B00 Additional rating plate provided separately Routine test certificate Z F20 Hand crank (also with motor-operated mechanism)

for manual charging of the closing spring in the vacuum circuit-breaker\_ Special designs (not as per catalog): Additionally state desired design in plain text

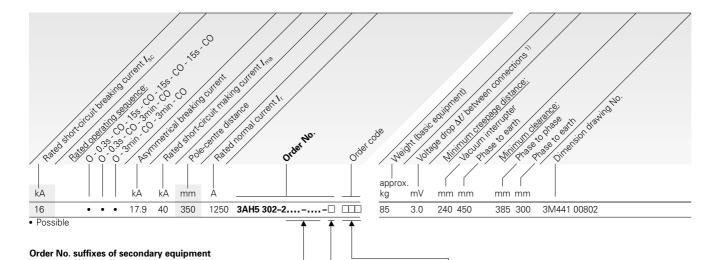
#### Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV) 41 kV peak value
- Rate of rise (RRRV) 0.47 kV/μs

1) According to IEC 60 694 with 100 A DC.

36 kV

Rated voltage  $U_{\rm r}$  **36 kV**Rated lightning impulse withstand voltage  $U_{\rm p}$  **170 kV**Rated short-time power frequency withstand voltage  $U_{\rm d}$  **70 kV**DC component **DC = 36 %** of the rated short-circuit breaking current



Z A10

Z A20

Z A21

Z F30 Z Y99

## see pages 4/8 and 4/9 \_\_\_\_ Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Condensation protection, heating for 230 V AC \_\_\_\_\_\_\_ Z A30 Silicone-free design \_\_\_\_\_ Z A31

Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG \_\_\_\_ **Z A45**Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz \_\_\_\_ **Z A46**Additional rating plate provided separately \_\_\_\_ **Z B00**Routine test certificate \_\_\_\_ **Z F20** 

## Values of transient recovery voltage

- Acc. to IEC 60 056
- Voltage (TRV)62 kV peak value
- Rate of rise (RRRV) 0.57 kV/μs

1) According to IEC 60 694 with 100 A DC.

#### Secondary equipment

## Basic equipment, additional equipment

In the <u>basic version</u>, the 3AH5 economy circuit-breaker is not wired and is supplied without terminal strip or plug connector.

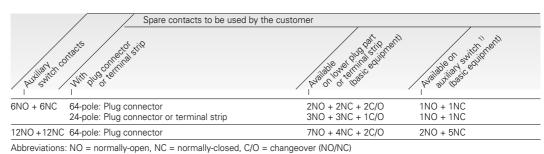
- Raic phort	- Addition of the state of the	Restates .
Manual snap-action	Manual stored-energy mechanism	With manual mechanism always with hand crank
operating mechanism	Motor stored-energy mechanism	Always with closing solenoid and anti-pumping
	O Closing solenoid 3AY15 10	Including "Spring charged" signal
• 1st shunt release 3AY15 10	<ul> <li>2nd shunt release 3AX11 01</li> <li>Current transformer-operated release 3AX11 02 for 0.5 A or 1 A</li> <li>Current transformer-operated release</li> </ul>	Max. 2 releases can be combined (refer to table below for combination possibilities and to order number suffixes on page 4/8).
<ul><li>Auxiliary switch</li><li>2NO + 2NC unwired</li></ul>	3AX11 04 for tripping pulse ≥ 0.1 Ws O Undervoltage release 3AX11 03	The current transformer-operated release for a tripping pulse ≥ 0.1 Ws is used in connection with the 7SJ41 protective system or with the protective relay made by SEG.
	O Auxiliary switch 6NO + 6NC, unwired	Spare contacts to be used by the customer
2NO + 2NC unwired	O Auxiliary switch 12NO + 12 NC, unwired	Option: Auxiliary switch contacts wired to plug connector
	Option: Auxiliary switch contacts gold-plated	Option: 12NO + 12NC available only with 64-pole plug connector
_	O Terminal strip, 24-pole or Plug connector, 24-pole or	Only in connection with auxiliary switches 6NO + 6NC and 12NO + 12NC
	Plug connector, 64-pole  Option: Pins of 64-pole plug connector gold-plated	Option: Scope of delivery of the plug con- nector: lower and upper plug parts with crimp sockets
		<u>Option:</u> Electrical equipment – such as motor, release – wired to terminal strip or plug connector
_	O Breaker tripping signal	-
_	Operating cycle counter	_
-	Mechanical interlocking	In the case of manual snap-action mechanism, mechanical scanning of the circuit-breaker positions
-	<ul> <li>○ Varistor circuitry ≥ 60 V DC (recommended for secondary DC circuit)</li> </ul>	For limiting overvoltages due to inductive loads
_	Halogen-free and flame-retardant wiring cables	Selection and ordering data see page 4/3 to 4/6
_	O Condensation protection for 230 V AC	Selection and ordering data see pages 4/3 to 4/6
_	<ul> <li>Hand crank (also with motor-operated mech- anism) for manual charging of the closing spring</li> </ul>	Selection and ordering data see pages 4/3 to 4/6
	○ Silicone-free design	=

# Combination possibilities of the releases

			Relea	ase com	binations	3			
Release			1/2	\mathrew{n}_{-1}	\ <u>\</u>	145	0	1	/ <sub>%</sub>
1st shunt release	type 3AY15 10	•	•	_	_	_	•	•	•
2nd shunt release	type 3AY11 01	_	•	-	-	-	-	-	-
Current transformer- operated release	type 3AX11 02, 0.5 A or type 3AX11 02, 1A or type 3AX11 04, 0.1 Ws	-	-	•	•	-	•	•	-
Undervoltage release	type 3AX11 03	-	-	_	-	•	_	-	•

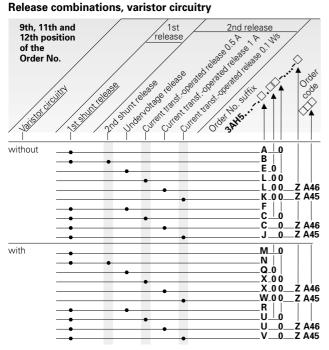
# Auxiliary switch contacts which can be used by the customer

Depending on the accessories fitted, spare terminals remain on the plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes. Prefabricated cables are available as accessories.

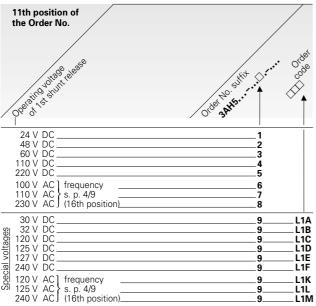


#### Order No. suffixes (secondary equipment)

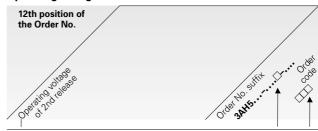
#### Release combinations, varistor circuitry



### Operating voltage of 1st shunt release



#### Operating voltage of 2nd release



		<u> </u>
Release as 2nd shunt release or undervoltage release	ı	1
24 V DC	1	
48 V DC 60 V DC		
110 V DC	3	
220 V DC	5	
100 V AC frequency	6	
110 V AC } s. p. 4/9 230 V AC } (16th position)		
30 V DC	9	_M1A
20 1/ DC	9_	_M1B
9) 32 V DC	9_	_M1C
월 125 V DC	9_	_M1D
\$ 127 V DC		_M1E
240 V DC	9_	_M1F
240 V DC 120 V AC   frequency	9	_M1K
ဟ် 125 V AC \ s. p. 4/9		_M1L
240 V ACJ (16th position)	9_	_M1M

#### Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

without AN 1902	
60 V DC	9M2D
110 V DC	9 M2E
220 V DC	99M2F
with AN 1902	
60 V DC	9 M3D
110 V DC	9 M3E
220 V DC	9 M3F

#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

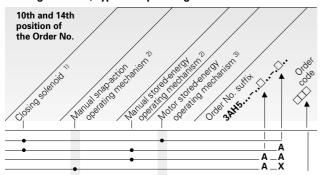
	**		
without AN 1901-2			
50/60 Hz 100 / 110 / 230 V AC_		9_	M2G
with AN 1901-2			
50/60 Hz 100 / 110 / 230 V AC_		9_	M3G

## Release when connected to c.t.-fed, digital overcurrent-time relay type WIP 1 (made by SEG)

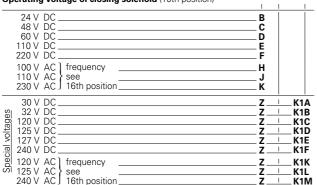
without protective relay	
24 V DC	99
with protective relay	
24 V DC	9 M3K

#### Continued

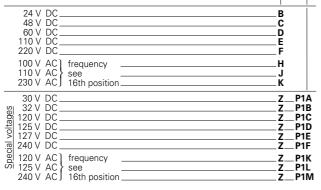
#### Closing solenoid, types of operating mechanisms



#### Operating voltage of closing solenoid (10th position)



#### Operating voltage of motor-operated mechanism (14th position)



- Closing solenoid always in conjunction with "spring charged" signal; suitable for auto-reclosure.
- 2) With manual operating mechanism a hand crank is always supplied.
- 3) Motor stored-energy operating mechanism always in conjunction with closing solenoid and anti-pumping.
- 4) Prepared for installation in 8BK20 switchgear with brought-out module plug, only in conjunction with Order No. suffixes **K** or **M** at the 15th position of the Order No.
- 5) Complete wiring of the releases and auxiliary switches to the lower plug part or terminal strip, only in conjunction with Order No. suffixes E to M at the 15th position of the Order No.

- 6) Electrical equipment, e.g.motors, releases, etc., are wired to the terminal strip or lower plug part.
  - The terminals of the auxiliary switch are not wired.
- 7) Wiring of the electrical equipment motor, release and auxiliary switch with the following Order No. suffixes at the 15th position of the Order No.:

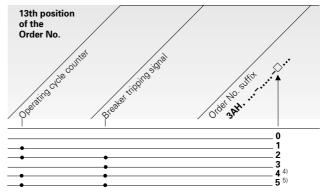
#### Order No. suffixes:

 $\underline{\underline{A}}$  to  $\underline{\underline{D}}$ : without plug connector and/or terminal strip, motor and release wired to free lead ends

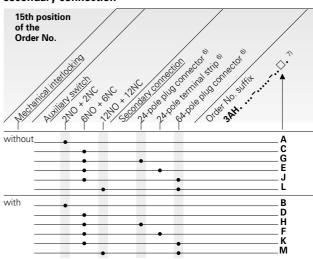
 $\underline{\textbf{E}} \text{ to } \underline{\textbf{H}} \text{: with plug connector and/or terminal strip, motor and release wired to lower plug part, auxiliary switch unwired }$ 

<u>J to M</u>: with plug connector and /or terminal strip, motor and release wired to lower plug part, auxiliary switch internally wired to lower plug part.

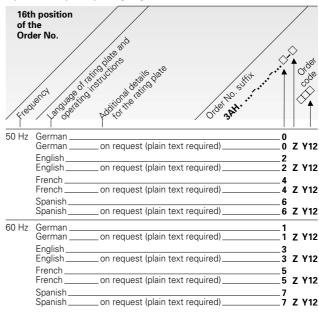
#### Operating cycle counter, breaker tripping signal



## Mechanical interlocking, auxiliary switch, secondary connection



#### System frequency, language



#### Accessories and spare parts

#### Installation parts

When releases / solenoids are being retrofitted, the Order Nos. of the installation parts must also be stated. With other types of additional equipment, the required installation parts are included in the delivery.

#### Spare parts

When releases / solenoids are required as spare parts, the Order No. and design of the appropriate economy circuit-breaker must be stated.

Fixings elements, installation instructions or circuit diagrams are supplied with all spare parts, if required.

#### **Ordering note**

The order numbers are applicable to economy circuit-breakers of current manufacture. When installation or spare parts are being ordered for an existing economy circuit-breaker, always quote the serial No. of the breaker (see "Rating plate" on page 1/3) in order to be certain of obtaining the correct items.

#### Accessories for the plug connector

(see page 4/11)

Option for economy circuitbreakers:

#### 24-pole

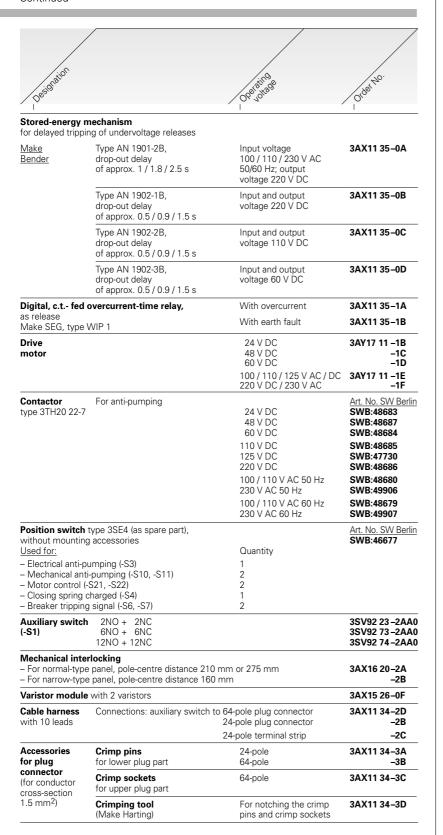
- Lower plug part
- Crimp sockets acc. to number of contacts
- Upper plug part with screw contacts (no crimp sockets necessary)

#### 64-pole

- Lower plug part
- Upper plug part
- Crimp sockets acc. to number of contacts

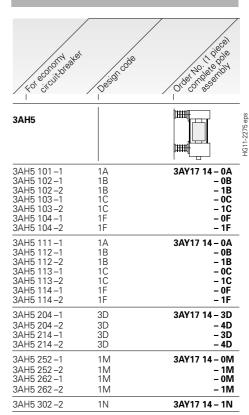
Designation		and rectifier 24 V − 32 V DC 3AX11 01 − 2B and rectifier 22 0 V − 220 V − 220 V AC 50 Hz 230 V AC 60 Hz 3AX11 02 − 2B and rectifier 24 V DC 3AX11 03 − 2B and rectifier 24 V DC 3AX11 03 − 2B and rectifier 24 V DC 3AX11 03 − 2B and rectifier 24 V DC 3AX11 01 − 2B and rectifier 24 V DC 3AX11 01 − 2B and rectifier 24 V DC 3AX11 01 − 2B and rectifier 3AX11 02 − 2B and rectifier 24 V DC 3AX11 03 − 2B and rectifier 24 V DC 3AX11 03 − 2B and rectifier 3AX11 03 − 2B and rectifier 3AX11 04 − 0B and rectifier 3AX11 03 − 2B and rectifier 3	
signative		arains e	781 NO.
		Oberton	/oru
Hand crank		<u>'</u>	3AX15 30 – 2B
Lubricant	190 g of Vlüber leefley Tappe I 22 and E0 g of Chall T	fallus 22 Oil (appoint oil)	2AV11 22 2A
(for special applications)	,	elius 32 Oli (special oli)	
.,,	1 kg of Klüber-Isoflex Topas L32		~-
	50 g of Shell Tellus 32 Oil (special oil) 1 kg of Shell Tellus 32 Oil (special oil)		
Operating	Used as closing solenoid		
solenoid	or 1st shunt release		
module 2nd		100 V – 124 V DC 125 V – 144 V DC	-3N
		200 V – 250 V DC	
Rectifier module	(Required in addition to operating solenoid with AC supply)	100 V – 250 V AC	3AX15 25 – 1F
2nd	Without varistor, without rectifier	24 V – 32 V DC	3AX11 01 – 2B
shunt release	Including varistor	110 V – 127 V DC	-2E
	Including varistor and rectifier	100 V – 120 V AC 50 Hz	3AX11 01 - 2G
Installation parts	with 1 shunt release fitted		3AX16 11 - 2A
Current transformer-			
operated	•		
release			-2B
Installation parts	230 V AC 60 Hz    230 V AC 60 Hz		
Undervoltage release	Without varistor, without rectifier		
.0.000	Including varistor	60 V DC	3AX11 03 - 2D
	la aludina variator and reatifier		
	including varistor and rectifier	110 V AC 50 Hz	-2H
		100 V AC 60 Hz	3AX11 03-3G
Installation parts	with 1 shunt release fitted		
Undervoltage release	The content special plications and rectifier and including varistor and rectifier rearted passes  For retain parts with 1 shunt release fitted dervoltage ease  Without varistor, without rectifier For rated normal current 1 A, incl. varistor and rectifier For tripping pulse ≥ 0.1 Ws, for SWP 1 protective relay, 24 V DC tallaltion parts with 1 shunt release fitted dervoltage ease  Combined with Bender AN 1902-, stored-energy mechanism the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism the stated voltage corresponds to the input voltage of the stored-energy mechanism tested voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism to the input voltage of the stored-		
reiease			
		110 V AC, 50/60 Hz 230 V AC, 50/60 Hz	
	,	22	<b></b>

#### Continued



#### Spare pole assemblies (complete)

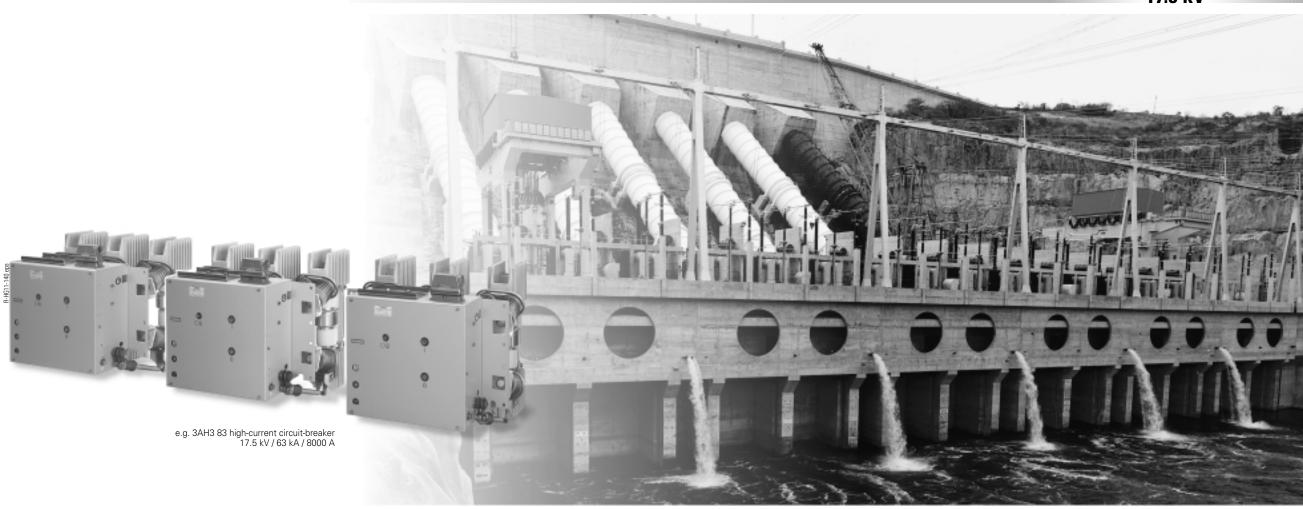
for deliveries as of January 1998



As spare parts the vacuum interrupters are always supplied as complete pole assembly incl. post insulator.

For the selection of the correct spare vacuum interrupter, it is necessary to state the design code and the serial No. of the economy circuit-breaker. Both are stated on the rating plate of the economy circuit-breaker.

## 17.5 kV



Xingó hydroelectric power plant, Brazil

Ordering data, examples for ordering	9	5/2
Selection and ordering data for 17.5 kV		5/3
Secondary equipmen  - Selection  - Order No. suffixes	t 5/4, 5/6,	
Accessories and spare parts	5/8,	5/9

Catalog section 5

#### Features of high-current circuit-breakers

- Rated voltage 17.5 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Consisting of 3 individual vacuum circuit-breakers, i.e. 1 vacuum circuit-breaker is used for each phase
- Rated normal currents up to 12,000 A
- DC components
   36 % acc. to IEC 60056, higher values on request
- 50 % acc. to ANSI C37.013
- Values of transient recovery voltage acc. to standards, other values on request
- Upright installation (standard), upright or reclined installation for 8BK40 and 8BK41 switchgear with order code "A71"
- Suitable for use in conjunction with generators

#### According to ANSI C37.013

• Rated short-circuit breaking currents of 50 kA and 63 kA

#### According to IEC 60056

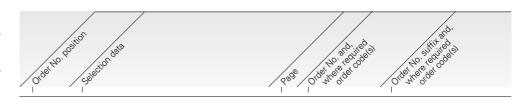
• Rated short-circuit breaking current 80 kA

#### Ordering data, examples for ordering

#### **Ordering data**

The 3AH3 83 high-current circuitbreakers are determined by a 16-digit Order No. According to the equipment fitted to the highcurrent circuit-breakers, this Order No. must be suffixed by one or more order codes.

- For selection and ordering data of the primary equipment with additional equipment see page 5/3.
- For associated Order No. suffixes (secondary equipment) see pages 5/6 and 5/7.



1st to 8th	3AH3 83 high-current circuit-breaker:								
position	- Rated voltage <i>U<sub>r</sub></i> 17.5 kV								
	<ul> <li>Rated short-circuit breaking current I<sub>SC</sub> 63 kA</li> <li>Rated lightning impulse withstand voltage U<sub>D</sub> 95 k</li> </ul>	V							
	– Pole-centre distance 275 mm								
	<ul> <li>Rated normal current I<sub>r</sub> 12 000 A</li> </ul>	_5/3_	3 A	H 3	8 3	8 – 8	з		
9th position	Closing solenoid, 1st shunt release and								
·	undervoltage release	_5/6_					. F .		
10th position	Electrical local closing, closing								
	solenoid operating voltage 230 V AC	_5/6_					V		
11th position	1st shunt release operating voltage	F/C							
	110 V DC	_5/6_	_··					4	
12th position	2nd release (undervoltage) operating voltage 220 V DC	E/G						_	
40.1									
13th position	Without 3rd release								
14th position	Operating mechanism voltage 230 V AC	_5/7_							K .
15th position	Without mechanical interlocking, auxiliary switch								
	12NO + 12NC, 64-pole plug connector	_5/7_							C
16th position	System frequency 50 Hz, rating plate								
	and operating instructions in German	_5/7_							(

#### 2nd example for ordering

When ordering			3 A H 3	838-8FV99-0KC0 M1F	
12th position	Operating voltage as special voltage of 2nd release (undervoltage) 240 V DC _	5/6		9	M 1 F
11th position	Operating voltage as special voltage of 1st shunt release 125 V DC	5/6		9	L 1 D
	High-current circuit-breaker as in first ex but	ample,	3 A H 3	8 3 8 - 8 F V 0 K C 0	

#### 3rd example for ordering

1st to 8th	3AH3 83 high-current circuit-breaker:		
position	– Rated voltage $U_{\rm r}$ 17.5 kV – Rated short-circuit breaking current $I_{\rm St}$		
	<ul> <li>Rated lightning impulse withstand vol</li> <li>Pole-centre distance 275 mm</li> </ul>	age $U_{p}$ 95 kV	
		5/3 <b>3 A H 3 8 3 0 - 8</b>	
9th position	Closing solenoid, 1st shunt release and varistor circuitry	5/6	
10th position	Mechanical local closing, closing solenoid operating voltage 110 V DC	5/6 <b>.E</b>	
11th position	1st shunt release operating voltage 110 V DC	5/6 <b>4</b>	
12th position	Without 2nd release	5/6	
13th position	Without 3rd release	5/70	
14th position	Operating mechanism voltage 230 V AC	5/7	
15th position	With mechanical interlocking, auxiliary s 6NO + 6NC, 24-pole terminal strip	vitch5/7	
16th position	System frequency 50 Hz, rating plate and operating instructions in English —	5/7	2
When ordering	ı, state:	order No. 3 A H 3 8 3 0 - 8 M E 4 0 - 0 K H 2	2

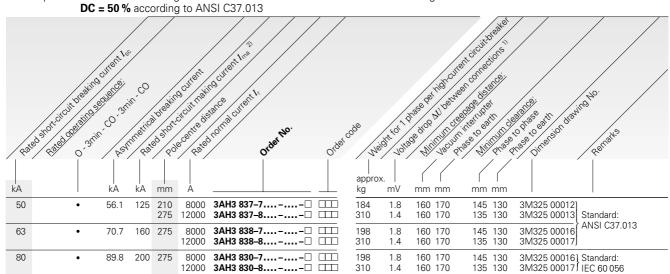
17.5 kV

Rated voltage  $U_r$  17.5 kV

Rated lightning impulse withstand voltage  $U_{\rm p}$  95 kV

Rated short-time power frequency with stand voltage  $U_{\rm d}$  38 kV (up to 42 kV see "Additional equipment")

DC component **DC = 36**% according to IEC 60 056 of the rated short-circuit breaking current



Z F30

Z Y99

Order No. suffixes of secondary equipment

see pages 5/6 and 5/7\_\_\_\_\_

#### Additional equipment

Possible

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables Z A10 Auxiliary switch contacts 6NO + 6NC and pins of 64-pole plug connector gold-plated Z A20 Auxiliary switch contacts 12NO + 12NC and pins of 64-pole plug connector gold-plated Z A21 Condensation protection, heating for 230 V AC Z A30 Current transformer-operated release (tripping pulse ≥ 0.1 Ws) for protective relay made by SEG Z A45 Current transformer-operated release (rated current 1 A instead of 0.5 A), 50/60 Hz Z A46 Vacuum circuit-breaker for upright or reclined installation in 8BK40 and 8BK41 switchgear Z A71 **Z** B00 Additional rating plate provided separately . Primary current paths silver-plated for external terminals and internal connections on both sides **Z D10** Primary current paths tinned for special ambient conditions Rated short-time power frequency with stand voltage  $U_{\rm d}$  = 42 kV instead of 38 kV Z E13 Routine test certificate. Z F20 Hand crank (also with motor-operated mechanism)

for manual charging of the closing spring in the vacuum circuit-breaker

Special designs (not as per catalog): Additionally state desired design in plain text

#### Design of highcurrent circuitbreakers

The high-current circuit-breakers consist of 3 individual vacuum circuit-breakers with 3 poles per phase.

## Values of transient recovery voltage

#### Acc. to ANSI C37.013

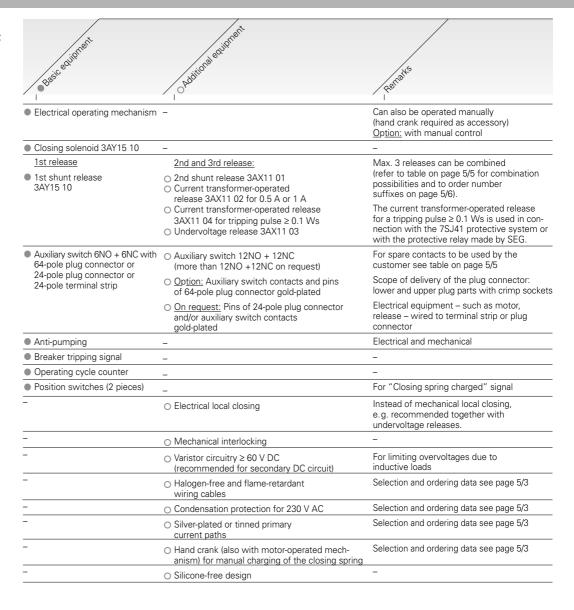
- Voltage (TRV) 32.2 kV peak value
- Rate of rise (RRRV) 4.5 kV/μs
- DC component
   50% of rated short-circuit breaking current

#### Acc. to IEC 60 056

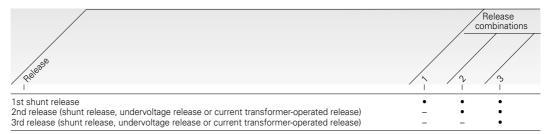
- Voltage (TRV) 30 kV peak value
- Rate of rise (RRRV)0.42 kV/μs
- DC component 36% of rated short-circuit breaking current
- 1) According to IEC 60 694 with 100 A DC per breaker pole.
- According to IEC 60 056.

#### Secondary equipment

## Basic equipment, additional equipment

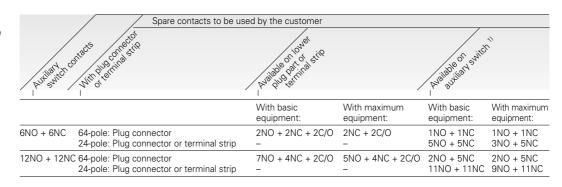


# Combination possibilities of the releases



• 1 piece per release. A maximum of 3 releases can be combined.

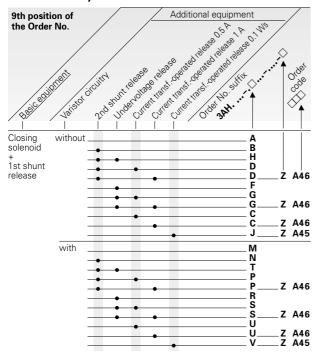
# Auxiliary switch contacts which can be used by the customer



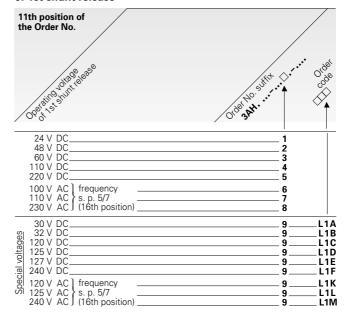
 Depending on the accessories fitted, spare terminals remain on the plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes. Prefabricated cables are available as accessories. Abbreviations: NO = normally-open NC = normally-closed C/O = changeover (NO/NC) 5

#### Order No. suffixes (secondary equipment)

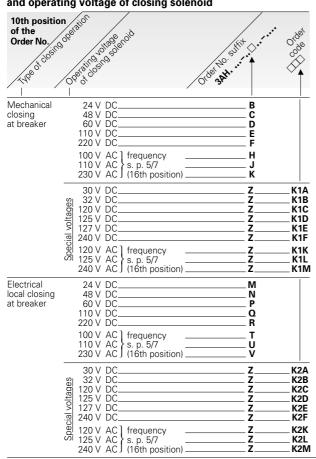
## Release combinations, varistor circuitry



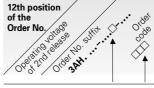
## Operating voltage of 1st shunt release



## Type of closing operation and operating voltage of closing solenoid



#### Operating voltage of 2nd release



#### Release as 2nd shunt release, current transformer-operated release or undervoltage release

rent transfoperated
1 2 3 4 5 5 1 frequency - 6 (s. p. 5/7 - 7
J (16th pos.)_ 8   9M1A
2 3 4 5 }frequency - 6 \$s. p. 5/7 - 7 (16th pos.)_8

_M1A	9_		DC.	30 V	
_M1B	. 9		DC.	32 V	S
_M1C	9_		DC.	120 V	96
					픩
					$\geq$
_ M1F	. 9		DC.	240 V	<u>.</u>
M1K	9	I frequency.	AC	120 V	ĕ
_M1L	. 9	\s. p. 5/7 .	AC	125 V	ΙΝ
_M1M	9_	(16th pos.)	AC	240 V	
_ M1E _ M1F _ M1K _ M1L	9 9 9	frequency.	DC DC AC AC	127 V 240 V 120 V 125 V	Special voltages

#### Release when connected to c.t.-fed, digital overcurrent-time relay type WIP1 (made by SEG)

without protective relay		
24 V DC	_ 9 _	_M2K
with protective relay		
24 V DC	_ 9 _	_М3К

## 12th p



# Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

without AN 1902		
60 V DC	9	M20
110 V DC	9	M2E
220 V DC	9	_M2F
with AN 1902		
60 V DC	9	M3E
110 V DC		_M3E
220 V DC		_M3F

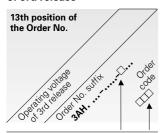
#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

without AN 1901-2	
50/60 Hz 100 / 110 / 230 V	AC_9M2G
with AN 1901-2	
50/60 Hz 100 / 110 / 230 V	AC_9M3G

5/6

#### Continued

## Operating voltage of 3rd release



## Release as current transformer-operated release or undervoltage release

without or current transfoperated release respectively0
24 V DC 1 48 V DC 2 60 V DC 3 110 V DC 4 220 V DC 5
100 V AC
30 V DC 9 N1A 30 V DC 9 N1B 32 V DC 9 N1B 32 V DC 9 N1C 32 V DC 9 N1E 33 V DC 9 N1E 34 V DC 9 N1E 35 V DC 9 N1E

#### Release when connected to c.t.-fed, digital overcurrent-time relay type WIP 1 (made by SEG)

without protective relay		
24 V DC	_ 9 _	_N2K
with protective relay		
24 V DC	_ 9	_ N3K

# 13th position of the Order No.

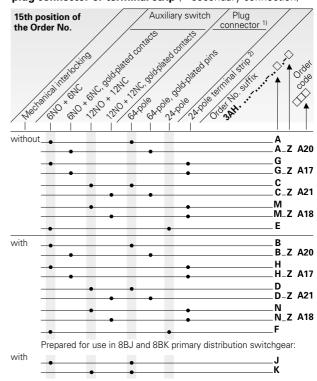
#### Release as undervoltage release when connected to stored-energy mechanism type AN 1902-. (made by Bender)

without AN 1902		
60 V DC	9_	_N2D
110 V DC	9_	_ N2E
220 V DC	9_	_ N2F
with AN 1902		
60 V DC	9	_N3D
110 V DC	9_	_ N3E
220 V DC	9 _	_N3F

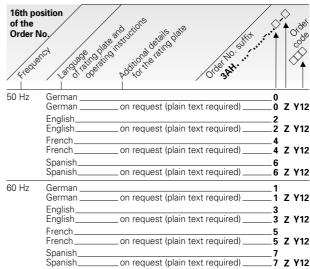
#### Release as undervoltage release when connected to stored-energy mechanism type AN 1901-2 (made by Bender)

without AN 1901-2		
50/60 Hz 100 / 110 / 230 V AC_	_ 9	_N2G
with AN 1901-2		
50/60 Hz 100 / 110 / 230 V AC_	_ 9 _	_N3G

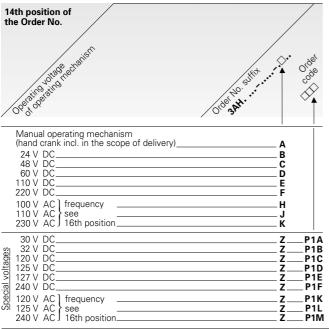
## Mechanical interlocking, auxiliary switch, plug connector or terminal strip (= secondary connection)



#### System frequency, language



#### Operating voltage of operating mechanism



- Depending on the accessories fitted, spare terminals remain on the 64-pole plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes.
  - Prefabricated cables are available as accessories.
- Auxiliary switch contacts are not wired on the terminal strip and can therefore be connected directly.

#### Accessories and spare parts

#### Installation parts

When releases / solenoids are being retrofitted, the Order Nos. of the installation parts must also be stated. With other types of additional equipment, the required installation parts are included in the delivery.

#### Spare parts

When releases / solenoids are required as spare parts, the Order No. and design of the appropriate high-current circuit-breaker must

Fixings elements, installation instructions or circuit diagrams are supplied with all spare parts, if required.

#### **Ordering note**

The order numbers are applicable to high-current circuit-breakers of current manufacture. When installation or spare parts are being ordered for an existing high-current circuit-breaker, always quote the serial No. of the breaker (see "Rating plate" on page 1/3) in order to be certain of obtaining the correct items.

#### Accessories for the plug connector

(see page 5/9)

Included in the scope of delivery for the high-current circuit-breaker's basic version:

#### 24-pole

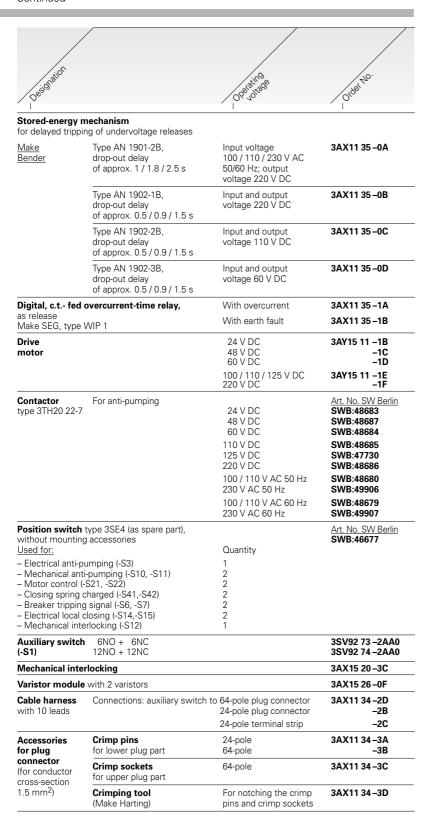
- Lower plug part
- Crimp sockets acc. to number of contacts
- Upper plug part with screw contacts (no crimp sockets necessary)

#### 64-pole

- Lower plug part
- Upper plug part
- Crimp sockets acc. to number of contacts

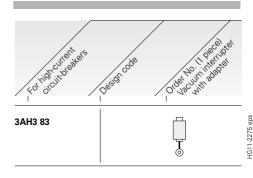
Designation		Obe ditte	Order No.
Hand crank		· I	3AX15 30 – 2B
Lubricant			
(for special applications)	180 g of Klüber-Isoflex Topas L32 and 50 g of Shell T 180 g of Klüber-Isoflex Topas L32 1 kg of Klüber-Isoflex Topas L32	Fellus 32 Oil (special oil)	3AX11 33 – 3A 3AX11 33 – 3H – 3E
	50 g of Shell Tellus 32 Oil (special oil) 1 kg of Shell Tellus 32 Oil (special oil)		3AX11 33 – 2G – 2D
Operating solenoid	Used as closing solenoid or 1st shunt release	24 V DC 32 V DC 48 V DC 60 V DC 100 V - 124 V DC 125 V - 144 V DC	3AY15 10 - 3B - 3M - 3C - 3D 3AY15 10 - 3E - 3N
Rectifier	For operating solenoid and/or	220 V – 250 V DC 100 V – 250 V AC	- 3F 3AX15 25 - 1F
module	drive motor (required with AC supply)		
2nd shunt release	Without varistor, without rectifier	24 V – 32 V DC	3AX11 01 – 2B
Shunt release	Including varistor	48 V - 60 V DC 110 V - 127 V DC 220 V - 240 V DC	3AX11 01 - 2C - 2E - 2F
	Including varistor and rectifier	100 V – 120 V AC 50 Hz 230 V AC 50 Hz	3AX11 01 – 2G – 2J
		100 V – 120 V AC 60 Hz 230 V AC 60 Hz	3AX11 01 – 3G – 3J
Current transformer-	For rated normal current 0.5 A, incl. varistor and rect For rated normal current 1 A, incl. varistor and rectifi		3AX11 02 – 2A – 2B
operated release			
Undervoltage release	Without varistor, without rectifier	24 V DC 48 V DC	3AX11 03 - 2B - 2C
	Including varistor	60 V DC 110 V DC 120 V – 127 V DC	3AX11 03 – 2D – 2E – 2N
		220 V DC 240 V DC	3AX11 03 – 2F – 2P
	Including varistor and rectifier	100 V AC 50 Hz 110 V AC 50 Hz 230 V AC 50 Hz	3AX11 03 – 2G – 2H – 2J
		100 V AC 60 Hz 110 V AC 60 Hz 230 V AC 60 Hz	3AX11 03 – 3G – 3H – 3J
	Combined with Bender AN 1902 stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism	60 V DC 110 V DC 220 V DC	3AX11 03 – 2D – 2E – 2F
	Combined with Bender AN 1901-2 stored-energy mechanism, the stated voltage corresponds to the input voltage of the stored-energy mechanism	100 V AC, 50/60 Hz 110 V AC, 50/60 Hz 230 V AC, 50/60 Hz	3AX11 03 – 3K – 3K – 3K
Installation parts	For 2nd shunt, current transformer-operated or undervoltage release:		
	With 1 shunt release fitted With 2 releases fitted (shunt, current transformer- operated or undervoltage release)		3AX17 11- 3A - 3B

#### Continued



#### Spare vacuum interrupters

for deliveries as of January 1998



For external pole assemblies				
3AH3 837 -7	1J	3AY17 15	- 1J	
3AH3 837 -8	1J		- 2J	
3AH3 838 -7	6E	3AY17 15	- 1E	
3AH3 838 -8	6E		- 2E	
2142 020 7	65		_ 15	

6E

3AH3 830 –8

For central pol	e assemblies		
3AH3 837 -7	1J	3AY17 15	– 1J
3AH3 837 -8	1J		– 2J
3AH3 838 -7	6E	3AY17 15	– 3E
3AH3 838 -8	6E		– 4E
3AH3 830 -7	6E		– 3E
3AH3 830 -8	6E		– 4E

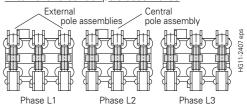
As spare parts the vacuum interrupters are always supplied with adapter.

For the selection of the correct spare vacuum interrupter, it is necessary to state the design code and the serial No. of the high-current circuit-breaker. Both are stated on the rating plate of the high-current circuit-breaker.

#### Complete exchange of vacuum interrupters

6 vacuum interrupters are required for the external pole assemblies of a high-current circuit-breaker and only 3 vacuum interrupters for the central pole assemblies.

#### External and central pole assemblies



High-current circuit-breaker consisting of 3 individual vacuum circuit-breakers with 3 poles per phase.



Körle substation, 110 / 15 kV,  $16^2/_3$  Hz (traction power supply) with ICE power unit

Catalog section 6	Page
Ordering data, examples for ordering	6/2
Selection and ordering data for – 17.5 kV, 16 <sup>2</sup> / <sub>3</sub> Hz – 27.5 kV, 50/60 Hz	6/3 6/4
Secondary equipment - Selection - Order No. suffixes 6	6/5 /6, 6/7
Accessories and spare parts 6	/8, 6/9

#### Features of 1-pole traction circuit-breakers

- Rated voltages 17.5 kV, 16<sup>2</sup>/<sub>3</sub> Hz and 27.5 kV, 50/60 Hz
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life up to 60,000 operating cycles
- Rated short-circuit breaking currents up to 50 kA
- DC component 36 %, higher values on request
- Values of transient recovery voltage acc. to standards, other values on request
- Rated lightning impulse withstand voltages 125 kV to 250 kV
- Suitable for use in conjunction with, for example Traction power supply installations

- Contact line sections
  Primary power supply (main circuit-breaker function) of locomotives and motor cars

#### **Ordering data**

The 3AH4 7 traction circuitbreakers are determined by a 16-digit Order No. According to the euipment fitted to the traction circuit-breakers, this Order No. must be suffixed by one or more order codes.

Ordering data, examples for ordering

- For selection and ordering data of the primary equipment with additional equipment see pages 6/3 and 6/4.
- For associated Order No. suffixes (secondary equipment) see pages 6/6 and 6/7.



1st exampl	e for ordering	1	1		1		
1st to 8th position	3AH4 7 traction circuit-breaker:  - For mechanical breaker service life 60,000 operating cycles  - Rated voltage $U_{\rm f}$ 17.5 kV, 16 $^2$ / <sub>3</sub> Hz  - Rated short-circuit breaking current $I_{\rm SC}$ - Rated lightning impulse withstand voltage $U_{\rm p}$ 125 kV  - Rated normal current $I_{\rm f}$ 2000 A  Additional equipment:  Halogen-free and flame-retardant wiring cables	6/3					
9th position	Closing solenoid, 1st shunt release, varistor circuitry and 2nd shunt release –	6/6			. N		
10th position	Mechanical local closing, closing solenoid operating voltage 230 V AC.						
11th position	1st shunt release operating voltage 230 V AC	6/6			8		
12th position	2nd release (undervoltage) operating voltage 230 V AC	6/6				8 –	
13th position	Without 3rd release						
14th position	Operating mechanism voltage 230 V AC						
15th position	Without mechanical interlocking, auxiliar 12NO + 12NC, 64-pole plug connector –	y switch					
16th position	Rating plate and operating instructions in German	6/7				0	
When ordering	9,	Order No. Order code	3 A H 4 A 1 0	754-	4 N K 8	8 – 0 K C 0	- Z

#### 2nd example for ordering

3AH4 7 traction circuit-breaker:

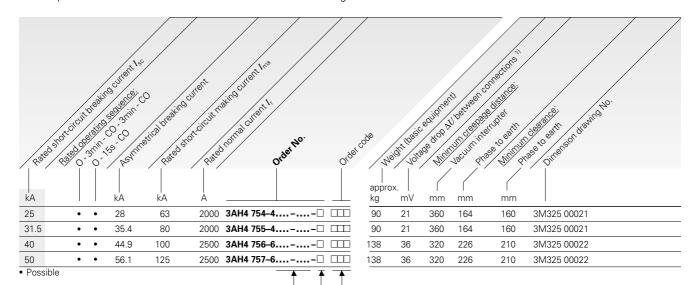
When ordering	g, state:	Order No.	3 A H 4	784-	4 N D 4	5 - 0 J C 4	
16th position	Rating plate and operating instructions in French					. – 4	 
15th position	Without mechanical interlocking, auxiliary switch 12NO + 12NC, 64-pole plug connector	6/7				C .	 
14th position	Operating mechanism voltage 110 V A	AC6/7 _				. <b>-</b> . J	 
13th position	Without 3rd release	6/7 _				. – 0	 
12th position	2nd release (undervoltage) operating voltage 220 V DC	6/6				5	 
11th position	1st shunt release operating voltage 110 V DC	6/6			4		 
10th position	Mechanical local closing, closing solenoid operating voltage 60 V DC	6/6			D .		 
9th position	Closing solenoid, 1st shunt release, varistor circuitry and 2nd shunt release	e6/6_			. N		 
position	– For mechanical breaker service life $60,000$ operating cycles  – Rated voltage $U_{\rm r}$ 27.5 kV, 50/60 Hz  – Rated short-circuit breaking current $I_{\rm r}$ – Rated lightning impulse withstand volume and current $I_{\rm r}$ 2000 A	oltage U <sub>n</sub> 170 kV	_3 A H 4	784-	4		 

17.5 kV, 16<sup>2</sup>/<sub>3</sub> Hz

Rated voltage  $U_r$  17.5 kV, 16 $^2/_3$  Hz

Rated lightning impulse with stand voltage  $U_{\rm p}$  125 kV Rated short-time power frequency with stand voltage  $U_{\rm d}$  50 kV

DC component DC = 36 % to 50 % of the rated short-circuit breaking current



Order No. suffixes of secondary equipment

see pages 6/6 and 6/7

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence:

Halogen-free and flame-retardant wiring cables	Z A10 Z A20 Z A21
Condensation protection, heating for 230 V AC	Z A30
Additional rating plate provided separately	Z B00
Routine test certificate	Z F20
Special designs (not as per catalog): Additionally state desired design in plain text	Z 730

#### Values of transient recovery voltage

- Acc. to EN 50 152-1
- Voltage (TRV) 36 kV peak value
- Rate of rise (RRRV) 0.33 kV/μs

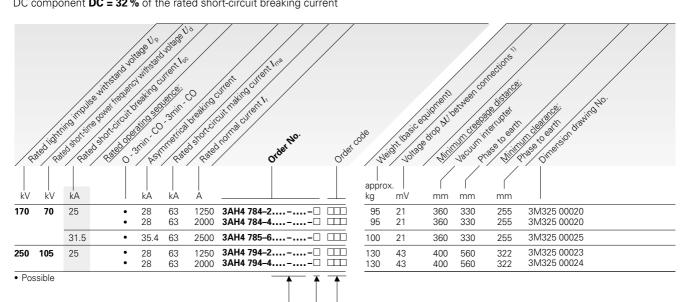
1) According to IEC 60 694 with 100 A DC

27.5 kV, 50/60 Hz

Rated voltage  $U_{\rm f}$  27.5 kV, 50/60 Hz

Rated lightning impulse withstand voltage  $U_{\rm p}$  170 kV or 250 kV (see table) Rated short-time power frequency withstand voltage  $U_{\rm d}$  70 kV or 105 kV (see table)

DC component DC = 32 % of the rated short-circuit breaking current



## Order No. suffixes of secondary equipment see pages 6/6 and 6/7\_\_\_\_

#### Additional equipment

Several versions can be ordered at the same time, i.e. by adding the required number of order codes to the Order No. in any sequence

Halogen-free and flame-retardant wiring cables	
Condensation protection, heating for 230 V AC	Z A30
Additional rating plate provided separately	Z B00
Routine test certificate  Hand crank (also with motor-operated mechanism) for manual charging of the closing spring in the vacuum circuit-breaker	Z F20 Z F30
Special designs (not as per catalog): Additionally state desired design in plain text	

#### Values of transient recovery voltage

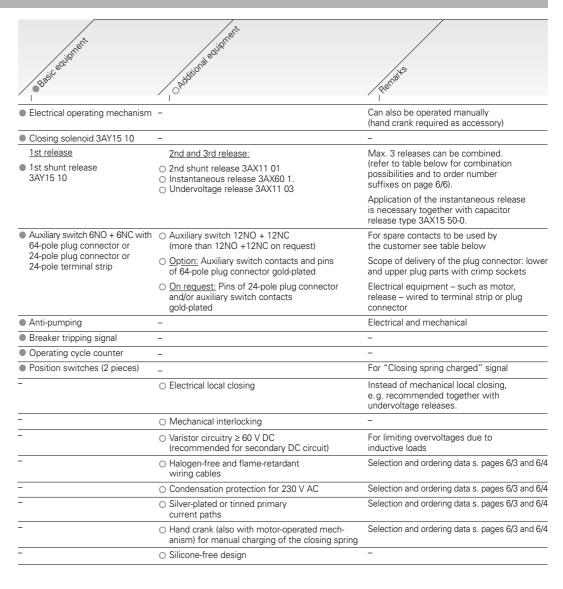
- Acc. to EN 50 152-1
- Voltage (TRV) 57 kV peak value
- Rate of rise (RRRV) 0.43 kV/μs

1) According to IEC 60 694 with 100 A DC.

6

#### Secondary equipment

## Basic equipment, additional equipment



## Combination possibilities of the releases

		Release combination		
\28 <sup>65</sup> 2			/3	
	/ i	1	ĺ	í
1st shunt release type 3AY15 10	•	•	•	•
2nd shunt release type 3AY11 01	•	-	•	-
Instantaneous release type 3AX60 1. (with capacitor release type 3AX15 50-0)	_	•	-	-
Undervoltage release type 3AX11 03	•	-	-	•

<sup>• 1</sup> piece per release. A maximum of 3 releases can be combined.

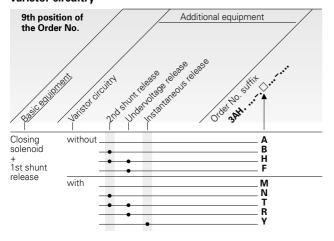
# Auxiliary switch contacts which can be used by the customer

Depending on the accessories fitted, spare terminals remain on the plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes. Prefabricated cables are available as accessories.

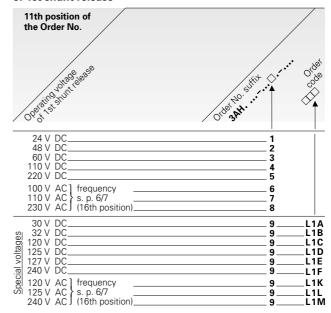
putility of co	Spare contacts to be under the contacts to be under the contact to be under th	sed by the customer		Available of Smith	^
	I	With basic equipment:	With maximum equipment:	With basic equipment:	With maximum equipment:
6NO + 6NC	64-pole: Plug connector 24-pole: Plug connector or terminal strip	2NO + 2NC + 2C/O -	2NC + 2C/O -	1NO + 1NC 5NO + 5NC	1NO + 1NC 3NO + 5NC
12NO + 12NC	64-pole: Plug connector 24-pole: Plug connector or terminal strip	7NO + 4NC + 2C/O -	5NO + 4NC + 2C/O -	2NO + 5NC 11NO + 11NC	2NO + 5NC 9NO + 11NC
Abbreviations:	NO = normally-open, NC = normally-close	ed, C/O = changeover (No	O/NC)		

#### Order No. suffixes (secondary equipment)

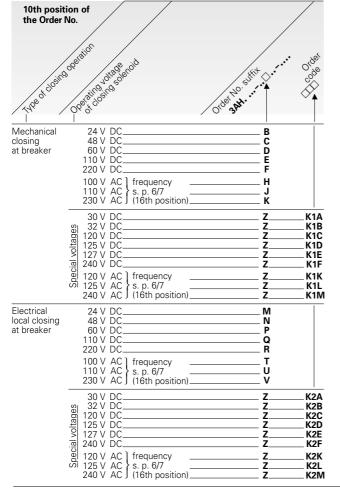
## Release combinations, varistor circuitry



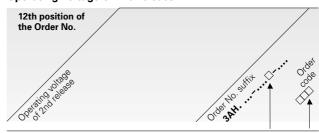
## Operating voltage of 1st shunt release



## Type of closing operation and operating voltage of closing solenoid



#### Operating voltage of 2nd release



## Release as 2nd shunt release, instantaneous release $^{\rm 1)}$ or undervoltage release

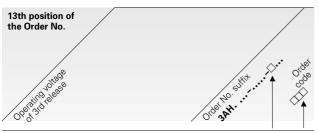
without or instantaneous release	0
24 V DC	1
48 V DC	
60 V DC	3
110 V DC	4
220 V DC	5
100 V AC   frequency	6
110 V AC \ s. p. 6/7	7
230 V AC J (16th position)	8
30 V DC	9M1A
gլ 32 V DC	9M1B
8) 32 V DC 6) 120 V DC 125 V DC 127 V DC	9M1C
띔 125 V DC	9M1D
.ը 240 V DC	9 M1F
240 V DC	9M1K
	9M1L
240 V AC J (16th position)	9M1M

h

<sup>1) 3</sup>AX60 1. instantaneous release selectable only for 60, 110 or 220 V DC.

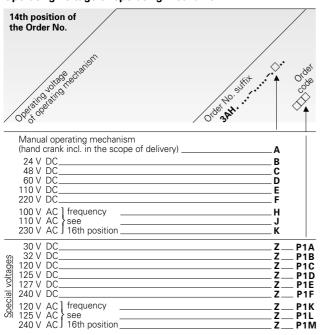
#### Continued

## Operating voltage of 3rd release

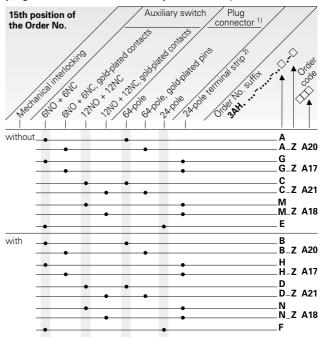


Release as undervoltage release	1 1
without undervoltage release	0
24 V DC	1
48 V DC	
60 V DC	3
110 V DC	
220 V DC	
100 V AC   frequency	
110 V AC \ see	
230 V AC J 16th position	8
30 V DC	9 N1A
φ <sub>1</sub> 32 V DC	
9 120 V DC	
125 V DC 127 V DC	
9 127 V DC	9 N1E
.평 240 V DC	
240 V DC	
240 V AC J 16th position	9 N1M

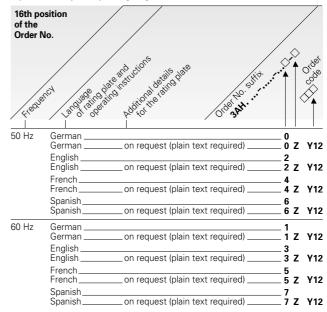
#### Operating voltage of operating mechanism



## Mechanical interlocking, auxiliary switch, plug connector or terminal strip (= secondary connection)



#### System frequency, language



- Depending on the accessories fitted, spare terminals remain on the 64-pole plug connector. The customer may connect them to spare auxiliary switch contacts as he wishes.

  Prefabricated cables are available as accessories.
- Auxiliary switch contacts are not wired on the terminal strip and can therefore be connected directly.

#### Accessories and spare parts

#### Installation parts

When releases / solenoids are being retrofitted, the Order Nos. of the installation parts must also be stated. With other types of additional equipment, the required installation parts are included in the delivery.

#### Spare parts

When releases / solenoids are required as spare parts, the Order No. and design of the appropriate traction circuit-breaker must be stated.

Fixings elements, installation instructions or circuit diagrams are supplied with all spare parts, if required.

#### **Ordering note**

The order numbers are applicable to traction circuit-breakers of current manufacture. When installation or spare parts are being ordered for an existing traction circuit-breaker, always quote the serial No. of the breaker (see "Rating plate" on page 1/3) in order to be certain of obtaining the correct items.

## Accessories for the plug connector

(see page 6/9)

Included in the scope of delivery for the traction circuit-breaker's basic version:

#### <u>24-pole</u>

- Lower plug part
- Crimp sockets acc. to number of contacts
- Upper plug part with screw contacts (no crimp sockets necessary)

#### 64-pole

- Lower plug part
- Upper plug part
- Crimp sockets acc. to number of contacts

/			
Designation		Operations of the control of the con	Order Nao.
Hand crank		·	3AX15 30 – 2B
<b>Lubricant</b> (for special applications)	180 g of Klüber-Isoflex Topas L32 and 50 g of Shell Tel 180 g of Klüber-Isoflex Topas L32 1 kg of Klüber-Isoflex Topas L32 50 g of Shell Tellus 32 Oil (special oil) 1 kg of Shell Tellus 32 Oil (special oil)	lus 32 Oil (special oil)	3AX11 33 – 3A 3AX11 33 – 3H – 3E 3AX11 33 – 2G – 2D
Operating solenoid	Used as closing solenoid or 1st shunt release	24 V DC 32 V DC 48 V DC 60 V DC	3AY15 10 – 3B – 3M – 3C – 3D 3AY15 10 – 3E
Rectifier	For appreting calengid and for	125 V – 144 V DC 220 V – 250 V DC 100 V – 250 V AC	- 3N - 3F 3AX15 25 - 1F
module	For operating solenoid and/or drive motor (required with AC supply)	100 V = 250 V AC	3AX 15 25 - 1F
2nd	Without varistor, without rectifier	24 V – 32 V DC	3AX11 01 – 2B
shunt release	Including varistor	48 V - 60 V DC 110 V - 127 V DC 220 V - 240 V DC	3AX11 01 – 2C – 2E – 2F
	Including varistor and rectifier	100 V – 120 V AC 50 Hz 230 V AC 50 Hz	3AX11 01 – 2G – 2J
		100 V – 120 V AC 60 Hz 230 V AC 60 Hz	3AX11 01 – 3G – 3J
Instantaneous release	( <u>Note</u> : Instantaneous release cannot be retrofitted with existing 2nd and/or 3rd release)	60 V DC 110 V DC 220 V DC	3AX60 13 - 0D 3AX60 12 - 0E 3AX60 11 - 0F
Capacitor release	Required for operation of the instantaneous release. The rated voltage of the release has to be selected in accordance with the operating voltage of the instantaneous release.	60 V DC 110 V DC 220 V DC	3AX15 50 - 0D * 3AX15 50 - 0E * 3AX15 50 - 0F *
Undervoltage release	Without varistor, without rectifier	24 V DC 48 V DC	3AX11 03 - 2B - 2C
	Including varistor	60 V DC 110 V DC 120 V – 127 V DC	3AX11 03 – 2D – 2E – 2N
		220 V DC 240 V DC	3AX11 03 – 2F – 2P
	Including varistor and rectifier	100 V AC 50 Hz 110 V AC 50 Hz 230 V AC 50 Hz	3AX11 03 – 2G – 2H – 2J
		100 V AC 60 Hz 110 V AC 60 Hz 230 V AC 60 Hz	3AX11 03 – 3G – 3H – 3J
Installation parts	For 2nd shunt release or undervoltage release: With 1 shunt release fitted With 2 releases fitted (shunt release		3AX17 11 – 3A – 3B

Ordering address: FEAG Sangerhausen GmbH Betrieb Berlin Gartenfelder Str. 29 D-13599 Berlin Germany

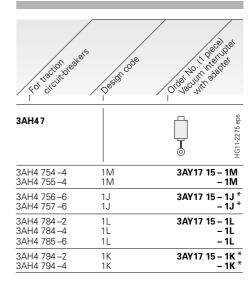
or undervoltage release)

<sup>\*</sup> Order No. of FEAG

#### **Drive motor** 24 V DC 3AY15 11-1B 48 V DC 60 V DC -1C -1D 100 / 110 / 125 V DC 220 V DC 3AY15 11-1E -1F Art. No. SW Berlin SWB:48683 Contactor For anti-pumping type 3TH20 22-7 24 V DC 48 V DC SWB:48687 60 V DC SWB:48684 110 V DC SWB:48685 125 V DC SWB:47730 SWB:48686 220 V DC SWB:48680 100 / 110 V AC 50 Hz 230 V AC 50 Hz SWB:49906 100 / 110 V AC 60 Hz SWB:48679 230 V AC 60 Hz SWB:49907 Position switch type 3SE4 (as spare part), Art. No. SW Berlin without mounting accessories SWB:46677 Quantity Used for: - Electrical anti-pumping (-S3) Mechanical anti-pumping (-S10, -S11) Motor control (-S21, -S22) 2 - Closing spring charged (-S41, -S42) 2 2 2 - Breaker tripping signal (-S6, -S7) - Electrical local closing (-S14, -S15) Mechanical interlocking (-S12) 6NO + 6NC 12NO + 12NC 3SV92 73 -2AA0 3SV92 74 -2AA0 Auxiliary switch (-S1) Mechanical interlocking 3AX15 20-3C 3AX15 26-0F Varistor module with 2 varistors 3AX11 34-2D Cable harness Connections: auxiliary switch to 64-pole plug connector 24-pole plug connector with 10 leads -2B 24-pole terminal strip e.g. spring washers and splint pins for c.-b. inspections 3AY15 50-0A Securing 1 set per traction circuit-breaker elements Accessories Crimp pins 24-pole 3AX11 34-3A 64-pole for plug connector -3B for lower plug part Crimp sockets 64-pole 3AX11 34-3C (for conductor for upper plug part cross-section 1.5 mm<sup>2</sup>) **Crimping tool** For notching the crimp 3AX11 34-3D pins and crimp sockets (Make Harting)

#### Spare vacuum interrupters

for deliveries as of January 1998



As spare parts the vacuum interrupters are always supplied with adapter.

For the selection of the correct spare vacuum interrupter, it is necessary to state the design code and the serial No. of the traction circuit-breaker. Both are stated on the rating plate of the tracton circuit-breaker.

<sup>\*</sup> In the case of traction circuit-breakers with 2 interrupters, both have to be exchanged.

## 7.2 to 36 kV



Mobile selective-cut road driving machine for underground mining type WAV 300 (photo Westfalia Lünen)

#### Catalog section 7

#### Features of special circuit-breakers

#### Special circuit-breakers

- Rated voltages 7.2 to 36 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 63 kA (r.m.s. value), min. 50 operating cycles
- DC component 36 %, higher values on request
- Values of transient recovery voltage acc. to IEC 60056, other values on request
- 1 and 2-pole special circuit-breakers derivable from the 3-pole 3AH1 to 3AH4 vacuum circuit-breakers
- Suitable e.g. for shipbuilding

#### Explosion-protected circuit-breakers

- Rated voltages 7.2 and 12 kV
- Maintenance-free up to 10,000 operating cycles
- Mechanical breaker service life 10,000 operating cycles
- Rated short-circuit breaking currents up to 23.6 kA (r.m.s. value)
- DC component 36 %, higher values on request
- Values of transient recovery voltage acc. to IEC 60056, other values on request
- Suitable e.g. for mining installations or chemical plants



3AH vacuum circuit-breaker assembly line

#### Catalog section A

dimensions

Conditions of A/2 sale and delivery, export regulations, trademarks,

#### Medium-Voltage Equipment and Components Subdivision

- Production shops at the Berlin switchgear factory for
   Vacuum circuit-breakers
   Vacuum contactors

- About 400 employees
- Facilities:

- Facilities:
  Development
  Design
  Type testing
  Accredited test bays
  Parts manufacture
- Surface treatmentSeveral assembly lines
- Routine testing and dispatch
  Training and information centre
- Quality management and environmental protection management

Appendix 3AH Vacuum Circuit-Breakers

#### **Conditions of Sale and Delivery**

Subject to the General Conditions of Supply and Delivery

for Products and Services of the Electrical and Electronic Industry and to any other conditions agreed upon with the recipients of catalogs. The technical data, dimensions and weights are subject to change unless otherwise stated on the individual pages of this catalog.

The illustrations are for reference only.

We reserve the right to adjust the prices and shall charge the prices applying on the date of delivery.

#### **Export Regulations**

In accordance with the present provisions of the German Export List and the US Commercial Control List, export licences are not required for the products listed in this catalog.

An export licence may however be required due to country-specific application and final destination of the products.

Relevant is the export criteria stated in the delivery note and the invoice regarding a possible export and reexport licence.

Subject to change without prior

#### **Trademarks**

All product designations used are trademarks or product names of Siemens AG or of other suppliers.

#### **Dimensions**

All dimensions in this catalog are given in mm.

